



**KULLIYYAH OF INFORMATION AND
COMMUNICATION TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE**

FINAL YEAR PROGRESS REPORT

PROJECT ID

1318D

PROJECT TITLE

iLoved: IIUM PRELOVED-ITEM MOBILE APP

STUDENTS

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FINAL YEAR PROJECT REPORT

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PROJECT ID

1318D

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iLoved: IIUM PRELOVED-ITEM MOBILE APP

PROJECT CATEGORY

SYSTEM DEVELOPMENT

by

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All praise to Allah SWT, the Most Gracious and Merciful, for granting us the strength, patience and perseverance to successfully complete our final year project, iLoved, a preloved item mobile app for IIUM students. Without His blessings, none of this would have been possible.

We would like to extend our heartfelt gratitude to our project supervisor, Asst. Prof. Dr. Amir ‘Aatieff, for his invaluable guidance, constructive feedback and continuous support throughout this journey. His expertise and encouragement have been instrumental in the successful development of this project.

Our deepest appreciation goes to our friend, Azmi Basharudin whose generous assistance and expertise in coding, particularly teaching us how to use React Native and deploy the app, greatly contributed to the project’s success.

Finally, we would like to extend our courtesy to everyone who is directly or indirectly involved during the whole process of completing this project. Our parents who provided endless motivation, the university who trusted us with the development of their course, our friends who picked us up when we were feeling down and the testers who enabled us to further enhance our app.

ABSTRACT

This project, iLoved, addresses the significant challenges faced by IIUM students in acquiring cheaper and affordable options while shopping for things by introducing a user-friendly and intuitive mobile application for seamless selling and buying preloved items within IIUM campus. The platform enables students to browse and filter items, chat with sellers to confirm their purchase and virtually try on the clothes. The system offers an interactive and engaging user experience, allowing students to directly chat with the seller if they are interested with the item sold in order to confirm details or negotiate prices. Additionally, with an innovative feature called virtual try on, the students can see how the items look like on them without having to physically try it.

The objectives include developing an intuitive mobile app, providing efficient and well-organised preloved items selling and buying process while promoting the benefits of sustainable shopping. The platform is designed to cater to the specific needs of the IIUM students ensuring all the transactions are secured and reliable. Furthermore, iLoved incorporates unique point systems allowing students to enjoy benefits of vouchers from IIUM vendors by collecting in-app points. This feature will ensure the continuous use of the app.

The conducted survey also shows the need of the application. The survey results revealed an unanimous interest, with all the respondents indicating that they would utilise the application once it is available. By leveraging technology to create a community-focused marketplace, iLoved not only offers a practical solution for daily shopping, but also promotes a culture of reuse and sustainability within the campus.

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CHAPTER 1: INTRODUCTION

1.1 PREAMBLE

IIUM Preloved-Item Mobile App is an interactive digital shopping application where we focus on students' used items. The app will have a feature called 'Virtual Try On' that allows buyers to visualise the item in real life. For example, what would the clothes look like on them? The purpose of this application is to help students shop for cheaper and more affordable options. The application will look like a normal shopping application, as it will have a search bar to search for items, a wishlist feature, a message feature where they can contact the owner of items, and users can also filter the categories of items they need. The users must have an account before using the app. The users also must use their IIUM email in order to use the application. The app promotes the ethical and responsible use of items by assisting in the buying and selling of preloved items among IIUM students.

1.2 PROBLEM DESCRIPTION

1.2.1 Background of the Problem

IIUM students prefer to buy preloved items than brand new items since it is cheaper and easier to buy. However, there have been quite a number of thrifted shops that sell items at a higher price making it unaffordable anymore. As a consequence, the accessibility of thrifting may be compromised, making students reassess their preferences and seek alternative sources for affordable preloved items.

1.2.2 Problem Statement

Currently, there is a preloved items' Whatsapp group for female students of IIUM. In the group chat, the seller will just promote their things and the buyer will have to text them privately to have a deal on trying the item or negotiating the price or meeting anywhere. The problem arises when the item does not suit the buyers' taste in real life and has wasted their time meeting one

another. Older posted items also will be hard to find and browse since it is just a group chat. The chat will be buried by new chats. Furthermore, the current options do not adequately support secure communication between the buyers and sellers, nor do they offer innovative features such as virtual try on that can significantly enhance the users' shopping experience. Other than that, limited access to affordable preloved items forces students to overspend on new items, or even worse the word 'thrifted' that has been a hip these days makes the preloved items no longer affordable.

1.3 PROJECT OBJECTIVE

1. Develop an intuitive mobile app for IIUM students.
2. Implement a "Virtual Try On" feature.
3. Enable secure in-app messaging for buyers and sellers.

1.4 PROJECT SCOPE

1.4.1 Scope

The “iLoved: IIUM Preloved-Item Mobile App” project focuses on the development of an interactive digital shopping application specifically designed for IIUM students. The application will feature a user-friendly interface for listing and browsing preloved items. It will also include a unique ‘Virtual Try On’ feature that allows buyers to visualise the item in real life. Additionally, the app will give buyers and sellers access to a secure messaging system for communication.

1.4.2 Target Audience

The primary target audience for this application is the student community of IIUM, both undergraduate and postgraduate students from all kuliyyah. The application aims to facilitate the buying and selling of used items within the IIUM community, promoting the ethical and responsible use of items.

1.4.3 Specific Platform

The mobile application will be developed using the React Native framework for cross-platform compatibility, allowing it to run on both Android and iOS devices. For backend services and databases, Firebase will be utilised. These platforms were chosen for their robustness, versatility, and extensive support for application development.

React Native, created by Meta, is an open-source framework for developing native applications across mobile, web, and desktop platforms using a unified codebase with JavaScript and React. It allows developers to create platform-specific components while maintaining a consistent user experience. With customisable components and strong community support, React Native enables efficient and scalable app development.

Firebase: Also developed by Google, Firebase is a platform providing backend services and tools for mobile and web app development. It includes authentication, real-time database, cloud storage, hosting, cloud messaging, analytics, and more, simplifying backend infrastructure setup for developers.

1.5 CONSTRAINTS

Virtual try on is a new technology for the developers so the developers are still short of knowledge of it. The developers need to learn and understand more about virtual try on. Other than that, developers also need to learn and practice on how to make a mobile application since we do not take the subject yet. Additionally, developers also lack knowledge in using Google API in order to track the users' location. We will need to learn about it in a short period. Other than that, the application will only be available for Android users since the development fee for IOS is expensive.

1.6 PROJECT STAGES

ID	Task Mode	Task Name	Days Remaining	Due date	February			March			April		May		June		
					9	12	15	13	14	20	29	3	5	10	20	25	4
0		iLoved: IIUM Preloved-Items Mobile App	-54	9/2/2024													
1	✓	Approach supervisor	-54	9/2/2024													
2	✓	Develop project proposal	-54	9/2/2024													
3	✓	Email potential supervisor	-54	9/2/2024													
4	✓	Get supervisor's approval	-54	9/2/2024													
5	✓	Consult with Advisor	-51	12/2/2024													
6	✓	Register on FYP dashboard	-51	12/2/2024													
7	□	Report Chapter 1	-5	29/3/2024													
8	✓	Conduct literature review	-21	13/3/2024													
9	✓	<i>Research academic papers, articles, and case studies related to preloved marketplace apps, user experience design, and mobile app development</i>	-21	13/3/2024													
10	✓	<i>Summarize key findings, trends, and best practices relevant to the project</i>	-50	13/2/2024													
11	✓	<i>Analyze competitor apps and identify strengths, weaknesses, opportunities, and threats</i>	-50	13/2/2024													
12	□	Consultation with supervisor	-7	27/3/2024													
13	□	Submission of Chapter 1	-5	29/3/2024													
14	□	Report Chapter 2	2	5/4/2024													
15	✓	Design project framework	-14	20/3/2024													
16	✓	<i>Design Flowchart</i>	-14	20/3/2024													
17	✓	<i>Design User Diagram</i>	-14	20/3/2024													
18	✓	<i>Design Activity Diagram</i>	-14	20/3/2024													
19	✓	<i>Design Class Diagram</i>	-14	20/3/2024													
20	□	Consultation with supervisor	0	3/4/2024													
21	□	Submission of Chapter 2	2	5/4/2024													
22	□	Prototype Design & Development	37	10/5/2024													
23	□	Drafting prototype design	37	10/5/2024													
24	□	Develop prototype	37	10/5/2024													
25	□	Consultation with supervisor	37	10/5/2024													
26	□	Submission of prototype	52	25/5/2024													
27	□	FYP Showcase Preparation	52	25/5/2024													
28	□	FYP Showcase	62	4/6/2024													
29	□	Final Report and Prototype Submission	72	14/6/2024													

Figure 1.6.1: iLoved: IIUM Preloved-Items Mobile App Project Stages

(Source:

<https://docs.google.com/spreadsheets/d/12VSsBvRFefkloB5wF3hcBDyDjlCFQjNwl16POX48Es/edit?usp=sharing>)

1.7 SIGNIFICANCE OF THE PROJECT

The “iLoved: IIUM Preloved-Item Mobile App” project holds significant value for several reasons:

1. Enhanced Shopping Experience: The application aims to revolutionize the way IIUM students shop for preloved items by offering a user-friendly platform that streamlines the buying and selling process.

2. Affordability: By focusing on used items, the app promotes affordability, enabling students to find items they need at lower prices.
3. Virtual Try-On Feature: This innovative feature allows buyers to visualise how an item would look on them, thereby enhancing their shopping experience and reducing the likelihood of dissatisfaction with purchased items.
4. Secure Communication: The in-app messaging system provides a secure platform for buyers and sellers to communicate, negotiate prices, and arrange delivery methods.
5. Promotion of Ethical Consumption: By facilitating the buying and selling of preloved items, the app encourages the ethical and responsible use of items, contributing to sustainability efforts.

1.8 SUMMARY

The “iLoved: IIUM Preloved-Item Mobile App” project aims to develop an interactive digital shopping application specifically for IIUM students. The primary problem it addresses is the lack of an efficient platform for buying and selling preloved items within the IIUM community. The application will feature a user-friendly interface, a unique ‘Virtual Try On’ feature, and a secure messaging system. It will be developed using the Flutter framework for cross-platform compatibility and Firebase for backend services. The project’s main constraints include the developers’ unfamiliarity with the virtual try-on technology and the need to learn how to develop a mobile application. Despite these challenges, the project holds significant potential to enhance the shopping experience for IIUM students, promote affordability, and encourage ethical consumption.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

Literature review is one of the important components in this project development. This preliminary research helps to deepen the understanding about the focus of the project by reviewing, identifying, and analysing the existing platforms of selling preloved-items. This allows the developers to fully understand the strengths and weaknesses of existing platforms and identify key areas that require improvements so that the project can be well implemented and developed in the later phases.

2.2 SYSTEM REVIEW

This section discusses several preloved items platforms that have existed and their advantages, and disadvantages.

2.2.1 Existing Products

1. Mudah.my

Mudah.my stands out as a specialized online classified advertisement platform designed specifically for the Malaysian market. It is the product of a collaboration between 701Search Singapore, a joint venture between SPH and Schibsted, and Telenor ASA from Norway. This partnership has cultivated a robust platform that features a wide array of categories encompassing products from diverse regions across Malaysia. Users appreciate the platform's extensive selection, enhanced by sophisticated filtering options that empower buyers to narrow down their searches based on criteria such as price, category, geographical origin, and other relevant parameters.



About Us

The philosophy behind our site lies in our name, Mudah.

Our site allows anyone to buy and sell in his or her region simply and conveniently. Mudah.my connects millions of buyers and sellers in Malaysia every month by delivering remarkable user experience on the site. Every Malaysian can find something to buy or sell on Mudah.my!

Who we are...

Mudah is part of Carousell, one of the world's largest and fastest growing marketplace platforms in Southeast Asia. Launched in August 2012, Carousell began in Singapore and now has a presence in eight markets under the brands Carousell, Mudah, Chot Tot and OneKyat. Carousell is backed by Telenor Group, Rakuten Ventures, Sequoia India and Naspers.

Visit www.carousell.com for more information.

Contents

About Us

- Who We Are

Rules and Regulations

- Rules of Advertising
- Terms and Conditions of Use
- Premium Services Terms and Conditions
- Illegal Goods
- Prohibited Goods and Service
- Pro Niaga: Naming Your Store

Privacy

- Privacy Policy

Help

- FAQ
- Search for ads



Shop Safely



Customer support and contact

Figure 2.2.1.1 : About Mudah.my

(Source: <https://www.mudah.my/about/#>)

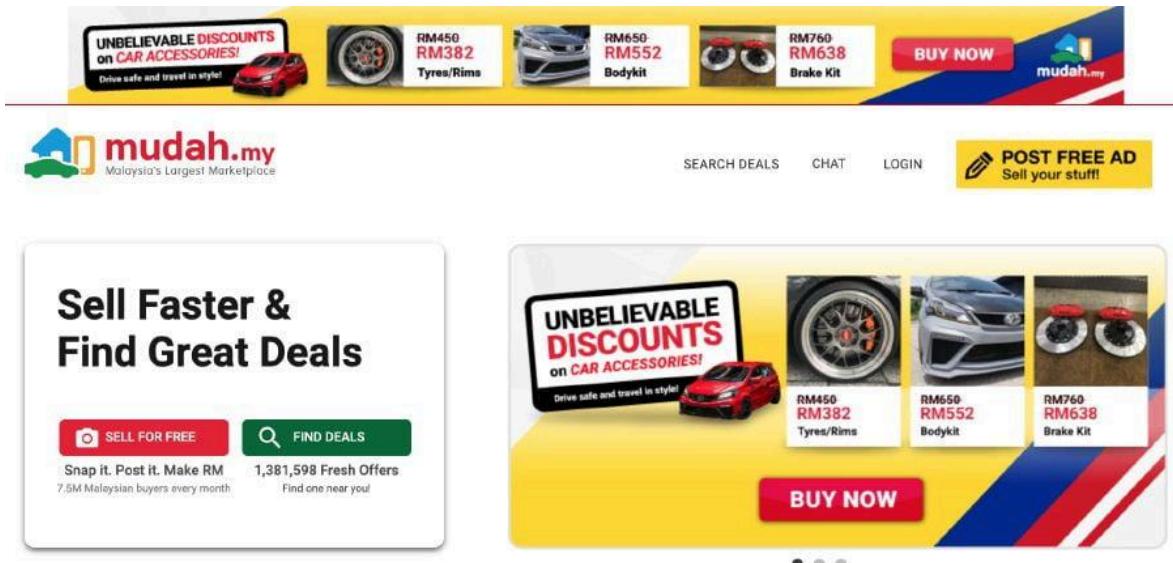


Figure 2.2.1.2: Mudah.my Auto Accessories Discounts

(Source: https://assets.nst.com.my/images/articles/Homepage_1598362247.jpg)



Figure 2.2.1.3: Souq IIUM Songket Edition Jersey on Mudah.my

(Source: <https://souq.iium.edu.my/storage/OcIWwspPqHg9MYMrXY5B8AjqeZieoSlA7BuNhVx7.jpg>)

Furthermore, Mudah.my emphasizes user privacy with its in-app messaging feature, which eliminates the necessity of sharing personal phone numbers. The platform is dedicated to facilitating seamless buying and selling experiences locally, aligning with its name "Mudah," which means "easy" in Malay. As a part of the Carousell network, Mudah.my connects millions of buyers and sellers throughout Malaysia, offering a user-friendly interface and outstanding service. With support from prominent investors such as Telenor Group, Rakuten Ventures, Sequoia India, and Naspers, Carousell has extended its presence beyond Singapore and now operates in eight markets under various brand names including Carousell, Chot Tot, and OneKyat. This expansion solidifies Carousell's position as one of Southeast Asia's largest and most rapidly expanding marketplace platforms.

2. WhatsApp Group 'PRELOVED ITEM (SISTER)'

The WhatsApp Group 'PRELOVED ITEM (SISTER)' caters exclusively to girls/sisters within IIUM, providing a convenient platform for buying and selling preloved items. This community operates within the popular messaging app, WhatsApp, ensuring easy accessibility for members. The group serves as a marketplace for individuals to sell items they no longer need and for others to find preloved treasures at affordable prices.

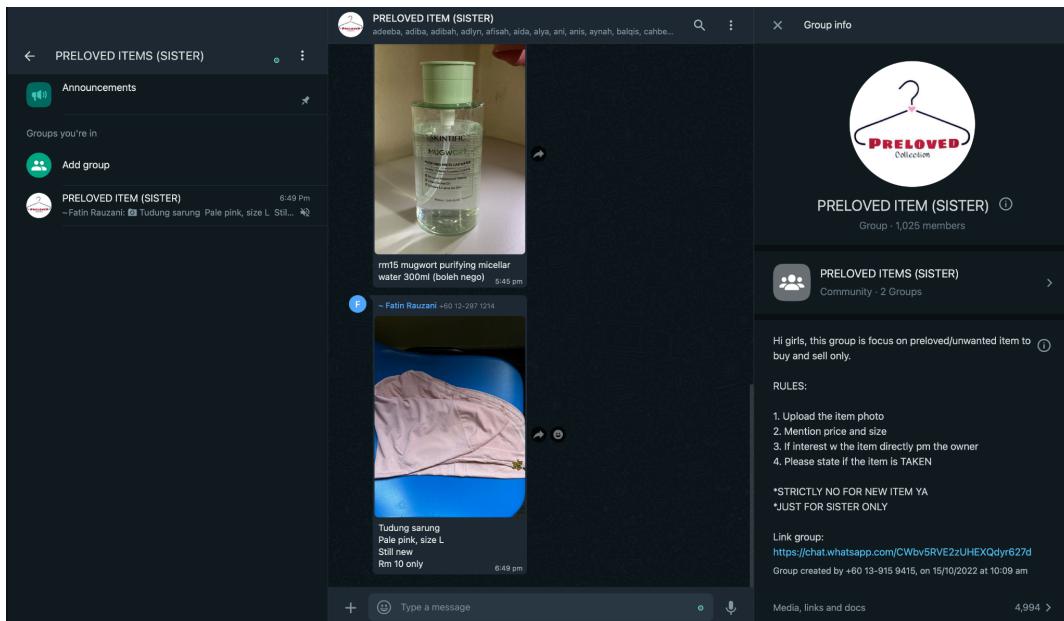


Figure 2.2.1.4: WhatsApp Group 'PRELOVED ITEM (SISTER)'

(Source: <https://chat.whatsapp.com/CWbv5RVE2zUHEXQdvr627d>)

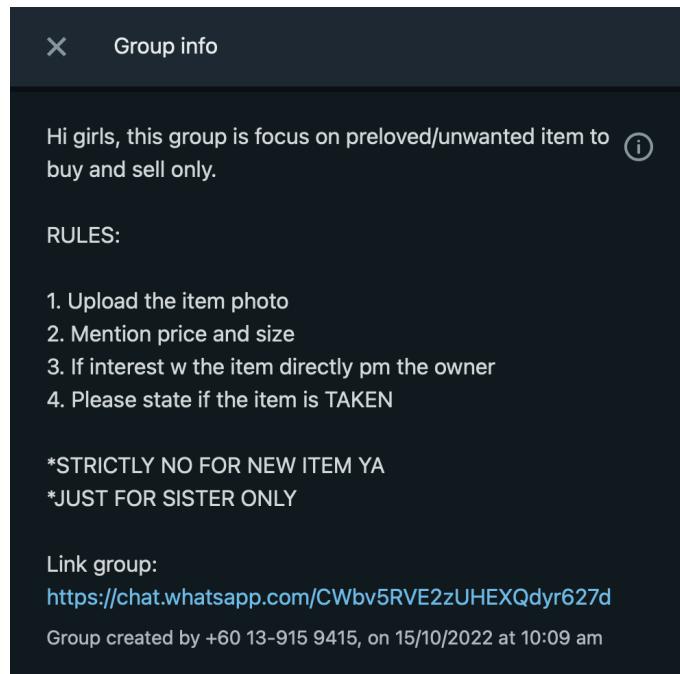


Figure 2.2.1.5: WhatsApp Group 'PRELOVED ITEM (SISTER)' Rules

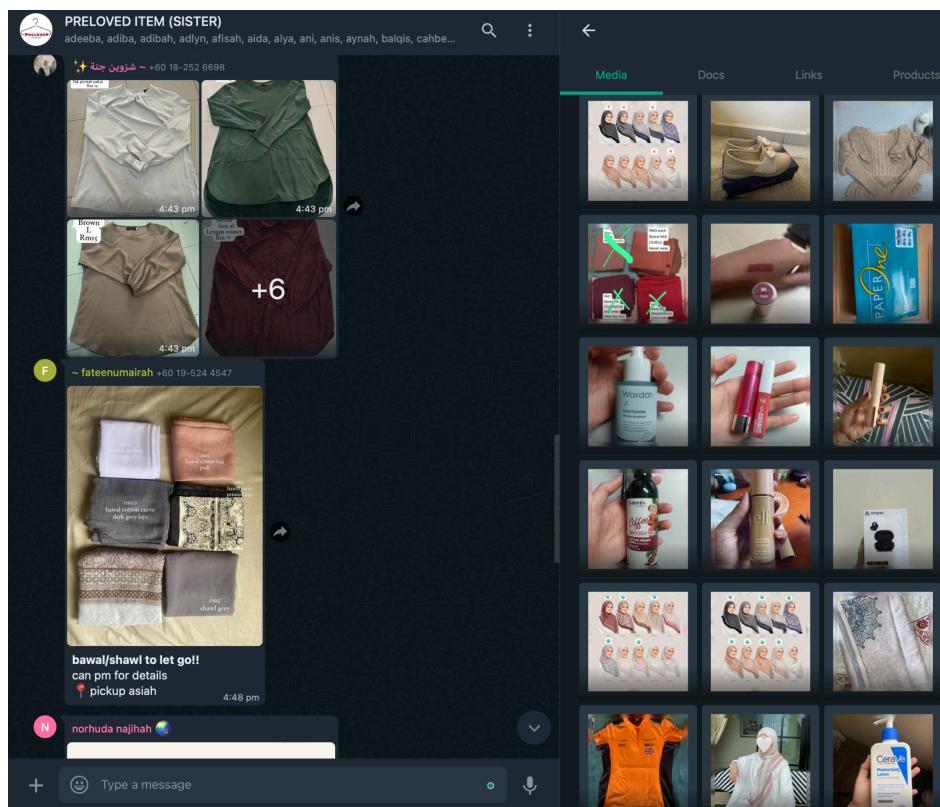


Figure 2.2.1.6: WhatsApp Group 'PRELOVED ITEM (SISTER)' Listings

With a focus solely on preloved/unwanted items, members adhere to specific rules to maintain the group's integrity, including uploading item photos, stating prices and sizes, and directly contacting the seller if interested. Additionally, members are reminded that the group strictly prohibits the sale of new items and is exclusively for sisters. Currently boasting over 1000 members, this vibrant community fosters a culture of sustainability and affordability among its members.

3. SOUQ IIUM

SOUQ serves as a platform within the IIUM community for posting unused or unwanted items, facilitating their exchange either for free or for a minimal fee. The primary aim is to promote the principles of 5R concepts: Refuse, Recycle, Repurpose, Reuse, and Reduce. Managed by the IIUM ITD Go Green Committee, the website's objective is twofold: firstly, to provide an online avenue encouraging students and staff to trade their items rather than discarding them, thereby reducing waste accumulation in landfills. Secondly, this initiative contributes to environmental preservation by repurposing items for others to utilise, aligning with the principles of reuse, recycle, and repurpose. The developer behind this initiative is Adis Nabawi, with icons courtesy of Freepik from www.flaticon.com.

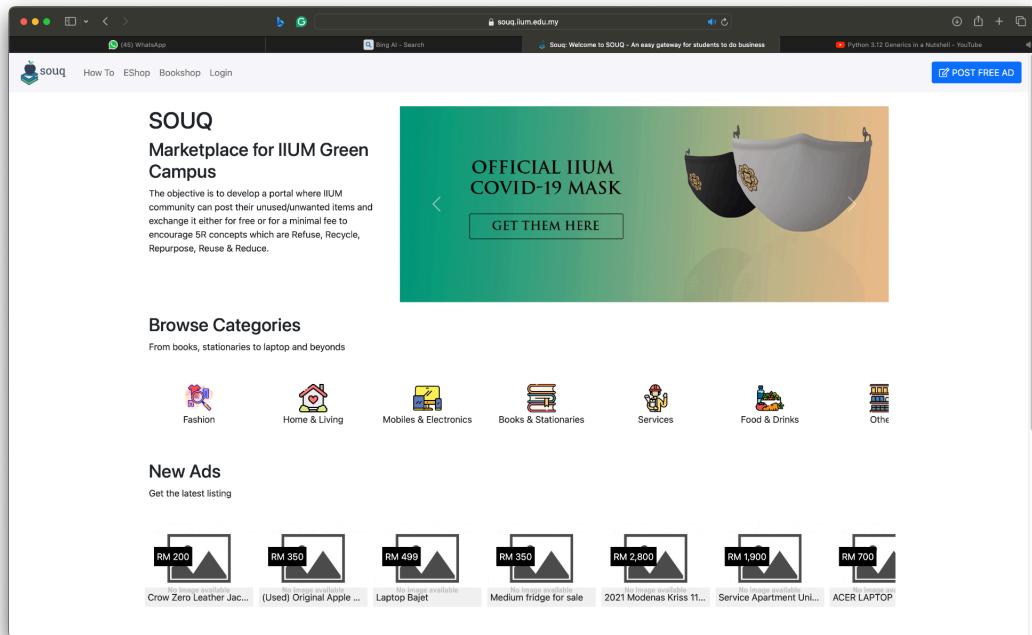


Figure 2.2.1.7: Souq IIUM Homepage

(Source: <https://souq.iium.edu.my>)

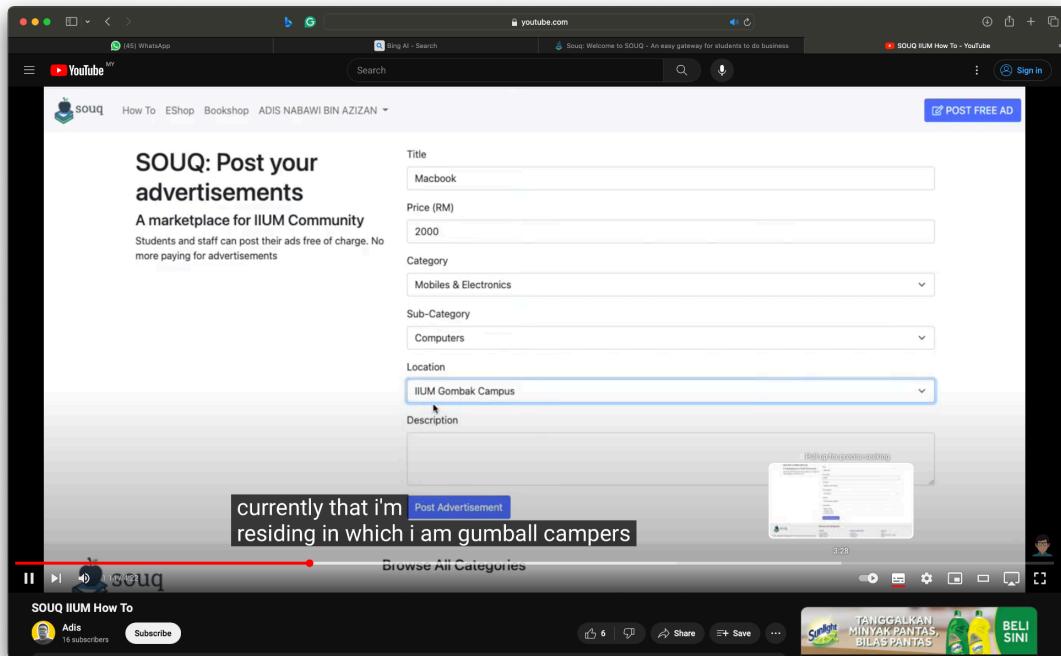


Figure 2.2.1.8: Souq IIUM How To

(Source: <https://www.youtube.com/watch?v=n95jMK2S02A>)

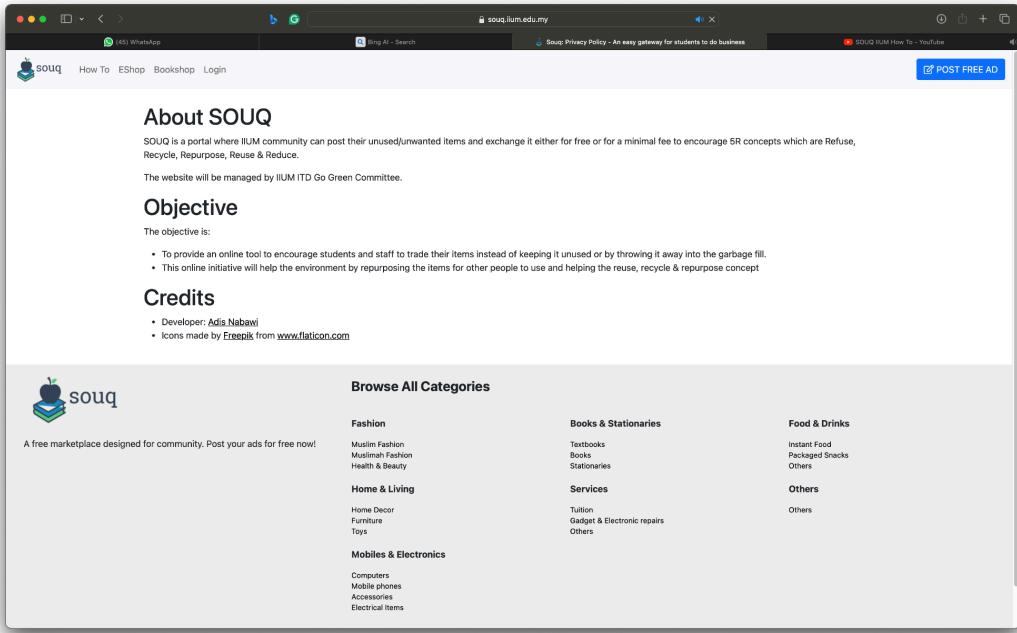


Figure 2.2.1.9: About Souq IIUM

(Source: <https://souq.iium.edu.my/about>)

Moreover, SOUQ operates as a community-oriented marketplace where users can post ads at no cost. It offers a diverse range of categories including Fashion (specifically Muslim Fashion and Muslimah Fashion), Health & Beauty, Home & Living (covering Home Decor, Furniture, and Toys), and Mobiles & Electronics (including Computers, Mobile phones, Accessories, and Electrical Items).

4. Carousell

Carousell is a free online platform where you can find and sell new and preloved items in various categories, such as electronics, fashion, home & living, toys, and games. The platform allows users to browse the latest listings, follow their favourite sellers, and enjoy buyer protection.

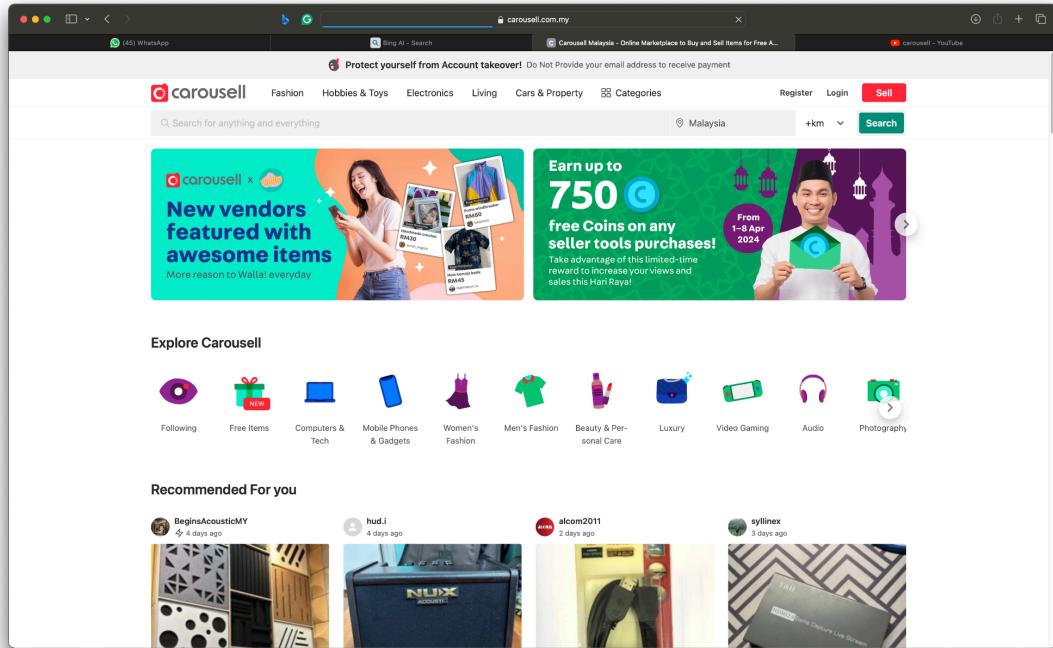


Figure 2.2.1.10: Carousell Homepage

(Source: <https://www.carousell.com.my>)

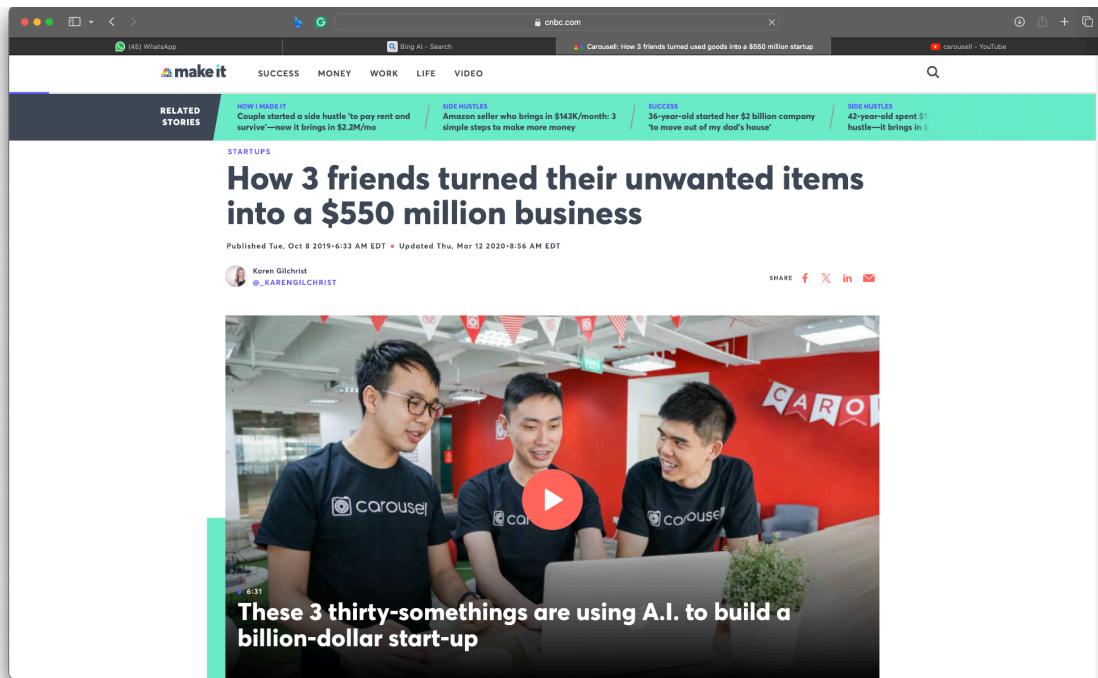


Figure 2.2.1.11: Carousell History

(Source:

<https://www.cnbc.com/2019/10/08/carousell-how-3-friends-turned-used-goods-into-a-550-million-startup.html>

2.2.2 Advantages and Disadvantages

Platforms	Advantages	Disadvantages
Mudah.my	<p>Mudah.my offers a vast array of categories, encompassing items from various regions across Malaysia. This diversity provides users with a broad selection to choose from. The platform also incorporates filtering features, allowing buyers to customise their search based on price, category, origin, and more. Additionally, Mudah.my includes an in-app texting function, enhancing user privacy by eliminating the need to disclose phone numbers.</p>	<p>Despite its advantages, Mudah.my has some drawbacks. The images displayed on the platform may not accurately represent the actual product, leading to potential discrepancies. Furthermore, the platform does not guarantee product authenticity, posing a risk for counterfeit items. Lastly, given its widespread use, there may be security risks related to personal information.</p>
Whatsapp Group 'PRELOVED ITEM (SISTER)'	<p>This group is easily accessible, as WhatsApp is a commonly used app. It allows buyers to inquire if anyone is selling specific items they are interested in, facilitating targeted searches.</p>	<p>However, the group has its limitations. Items might not meet the buyers' expectations in real life, potentially wasting their time in meeting the seller. Additionally, due to the nature of group chats, older posts can be hard to find and browse as they get buried by new chats.</p>
<u>SOUQ IIUM</u>	<p>SOUQ IIUM offers a diverse range of listings, catering to</p>	<p>Despite its diverse listings, the platform falls short in terms of</p>

	various user needs.	user interface design and ease of navigation. This can lead to a less intuitive user experience, potentially deterring some users.
Carousell	Carousell provides mobile applications for both iOS and Android devices, offering users convenient access to the platform from their smartphones or tablets. This accessibility significantly enhances the platform's popularity and fosters higher user engagement. Additionally, Carousell features a wide variety of listings, further enriching the user experience by catering to diverse preferences and interests.	However, Carousell also has its drawbacks. Similar to SOUQ IIUM, it lacks in terms of user interface design and navigation, potentially leading to a less intuitive user experience. Additionally, the platform's lack of buyer protection could deter some users, as they may feel their interests are not adequately safeguarded.

Table 2.2.2.1: Advantages and disadvantages of existing platforms

In summary, each platform has its unique strengths and weaknesses. Mudah.my is known for its wide variety of items from various locations in Malaysia, its filtering features, and an in-app texting function. However, it does face potential issues with product authenticity, image accuracy, and security risks. The WhatsApp Group 'PRELOVED ITEM (SISTER)' is easily accessible and allows buyers to request specific items, but it has limitations in terms of item suitability and difficulty in browsing older posts due to the nature of group chats. SOUQ IIUM provides a diverse range of listings but falls short in terms of user interface design and ease of navigation. Carousell, while offering mobile apps for convenient access and diverse listings, also suffers from a lack of intuitive user interface design and navigation, and a potential lack of buyer protection. Therefore, users should consider these factors when choosing a platform to ensure it caters to their specific needs and preferences.

2.3 SYSTEM ADAPTATION

Based on the existing preloved-item selling apps, there are already so many features that will be useful for our app as well, such as products listing, filtering and sorting products and many more. However, due to failings that we spot from the platforms, we would like to make some improvements and changes for our apps so that it will become more convenient, useful and creative.

Firstly, the proposed significant value to add in our app is virtual try on. Users will be able to see how the products will look like on them and will the colours of the products suit their skin tone. Secondly, as most of the platforms we researched are used widely across Malaysia, our app will only be available to use for IIUM students, where the app will detect their current location. If they are outside IIUM, the app will not be accessible. Thirdly, our app will also have points collection for each transaction. The sufficient amount of points will enable the users to redeem vouchers from IIUM vendors.

2.4 LITERATURE REVIEW

Founded on May 1, 2012, by Quek Siu Rui, Marcus Tan, and Lucas Ngoo from the National University of Singapore (NUS), Carousell emerged from a vision to utilise technology for enhancing everyday transactions. During a year-long visit to Silicon Valley sponsored by NUS, Marcus Tan and Lucas Ngoo drew inspiration from their experiences to conceive Carousell.

The journey began with scepticism and rejection, even from the founders' professor at NUS. Undeterred, the students persisted, refining their idea and eventually securing \$7,000 from their professor to develop the first Carousell app. Their breakthrough came at Startup Weekend in September 2012, where Carousell triumphed over 80 competing teams, marking the start of a remarkable journey.

Following their graduation from NUS in 2013, the team dedicated themselves fully to Carousell's growth. In August 2012, Carousell launched its first iOS app, marking a significant milestone in its development. Subsequent funding rounds, including seed funding from government grants and QuestVC, and later investments from Rakuten and other notable investors, fueled Carousell's expansion and development.

By November 2014, Carousell had secured \$6 million in Series A funding, followed by a substantial \$50 million in Series B funding. These investments enabled Carousell's expansion into Malaysia, Indonesia, Hong Kong, and Taiwan. Today, Carousell boasts over 40 million listings and stands as one of the largest and fastest-growing global marketplaces, with a significant user base aged between 16 to 34 years. The Carousell story exemplifies tenacity, persistence, and perseverance, inspiring anticipation for the team's future endeavours.

Each of these platforms offers unique features that cater to different user needs. They provide convenient and accessible means for users to buy and sell items, whether new or preloved. However, they also have their own set of challenges and limitations that users need to be aware of.

Virtual try-ons (VTOs) have become a significant tool in the retail industry to address and reduce product uncertainty, thereby increasing online product sales and decreasing product returns. According to research by Yadav, K. C. (2023), by allowing shoppers to virtually try on items, they gain a more accurate representation of the fit, style, and colour of products, which aids in making more informed purchasing decisions and reduces the likelihood of returns. The convenience, confidence-boosting capabilities, personalised experiences, and positive environmental impact associated with virtual try-ons make this technology a transformative force in the retail sector.

The iLoved app incorporates a virtual try-on feature, which enhances the shopping experience by allowing users to see how items fit and look on them before making a purchase. This feature not only boosts user confidence in their buying decisions but also reduces the chances of returns, making the buying process smoother and more satisfying. This aligns with

the research findings that VTOs increase sales and decrease returns, positioning iLoved as a user-friendly and efficient platform for preloved items.

In Malaysia, sustainable fashion consumption is heavily influenced by personal norms, social norms, and increasing environmental awareness. Research by Sulaiman, Z., Hasbullah, N. N., & Mas'od, A. (2022) presents a conceptual framework that underscores the impact of perceived value on sustainable fashion consumption, particularly amid the Covid-19 era. The fashion industry's circular value chain is identified as a significant contributor to environmental degradation at each stage of production. Specific studies conducted in Malaysia reveal substantial pollution affecting water, air quality, and overall environmental health due to fashion-related activities.

The iLoved app actively promotes sustainable fashion consumption by facilitating the exchange of preloved items. This approach helps minimize waste and reduces the environmental footprint associated with the manufacturing of new clothing. By providing a user-friendly platform for buying and selling second-hand items, iLoved supports the growing trend towards sustainability in fashion. This initiative aligns with principles of personal and social responsibility highlighted in current research, positioning the app not only as a marketplace but also as a contributor to environmental conservation efforts.

Brick-and-mortar stores are physical retail locations where customers can shop in person, contrasting with online businesses that operate digitally. According to Fundera (2023), there has been a significant shift in consumer shopping behaviour since 2001, with online sales increasing by 300% while department store sales have declined by 50%. The primary distinction between online and brick-and-mortar businesses lies in their operational models: online businesses utilise digital platforms to engage with customers, whereas brick-and-mortar stores rely on physical storefronts to attract shoppers.

The iLoved app capitalises on the growing trend of online shopping by providing a digital platform for buying and selling preloved items. This shift from brick-and-mortar to online aligns with consumer preferences for convenience and accessibility. The app's user-friendly interface

and comprehensive features, such as browsing items, virtual try-ons, and direct communication between buyers and sellers, offer a seamless shopping experience. This positions iLoved as a relevant and significant player in the evolving retail landscape, effectively meeting the needs of modern consumers who prefer online shopping over traditional in-person retail.

CHAPTER 3: METHODOLOGY

3.1 INTRODUCTION

This chapter comprehensively describes and justifies all the methodological choices made in the study. The research for the development of the iLoved: IIUM Preloved-Item Mobile App employs qualitative methods to gather in-depth insights into the needs and preferences of the target audience. Data was collected using forms and questionnaires, which were designed to elicit detailed responses from participants. Convenience sampling was employed to select participants, focusing on IIUM students who are easily accessible and willing to provide feedback. This approach was chosen to ensure the data collection process is efficient and relevant to the specific context of the IIUM community.

3.2 DEVELOPMENT APPROACH

The development approach chosen for this project is rapid prototyping. Rapid prototyping involves the quick creation of preliminary versions or prototypes of a product or system to test its functionality, design, and usability. This iterative process allows developers to create a working model of the app early in the development cycle and refine it through continuous feedback and testing.

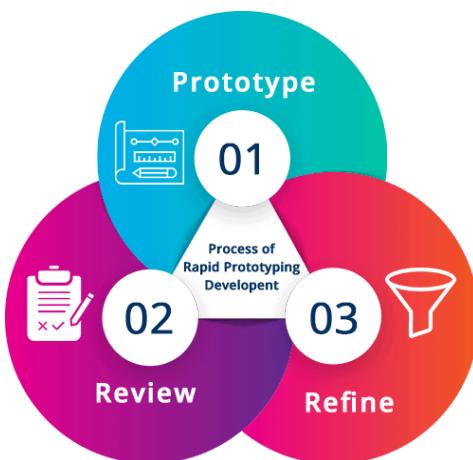


Figure 3.1.1: Process of Rapid Prototyping Development

Explanation of Rapid Prototyping:

Rapid prototyping involves several key stages:

1. Requirement Gathering and Analysis: Initial requirements are gathered from stakeholders through qualitative methods, including forms and questionnaires.
2. Prototype Development: A preliminary version of the app is developed quickly based on the gathered requirements. This prototype includes basic functionalities and features.
3. User Feedback: The prototype is presented to potential users (IIUM students) to gather feedback on its usability, design, and functionality.
4. Iteration: Iteration involves refining and enhancing the prototype based on feedback received. This iterative process continues until the app aligns with and fulfils the expectations and requirements of its users.

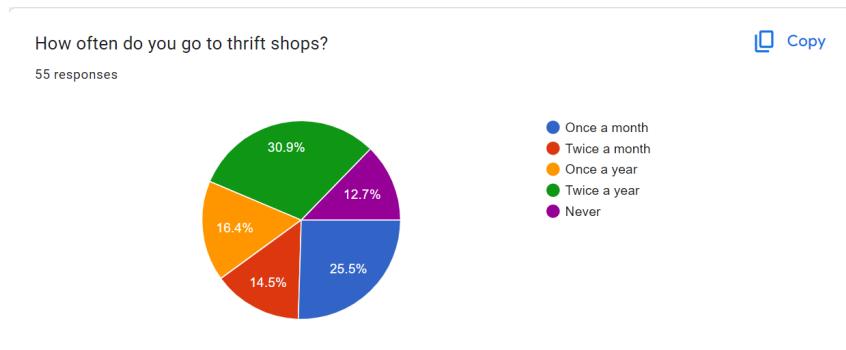
Reasons for Choosing Rapid Prototyping:

- Iterative improvement through rapid prototyping enables continuous enhancement based on user feedback, ensuring the final product is centred around users' needs and preferences.
- Early Detection of Issues: By creating and testing a prototype early, developers can identify and address potential issues before they become significant problems.
- Enhanced Communication: Prototypes serve as a visual tool to communicate ideas and functionalities to stakeholders, facilitating better understanding and collaboration.
- Flexibility: The iterative nature of rapid prototyping accommodates changes and new ideas, making it suitable for projects where requirements may evolve.

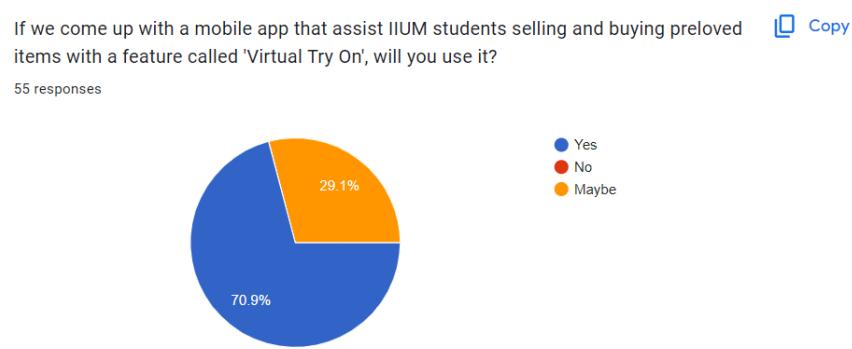
3.3 REQUIREMENTS SPECIFICATION

The method used to gather the requirements is an online questionnaire. The questions are included in Appendix A. Second, the intended target audiences are IIUM students and staff who want to opt for cheaper and affordable preloved-items. As there are multiple categories for the targeted audiences, the quickest way to gather and collect data from them is by distributing online questionnaires. The results from the online questionnaire can be used to further analyse the requirements that have been provided by the subject matter expert (SME). The questionnaire is available in Appendix A.

3.3.1 The Findings



Based on the graph above, 87.3% of the respondents have gone to thrift shops, indicating a strong potential user base for our application.



Based on the graph above, all of the respondents would like to try our mobile app for selling and buying preloved items with the Virtual Try On feature. This shows that our app is a useful

invention for the IIUM community in assisting the students selling and buying cheaper items while enhancing the user's experience shopping using the new feature.

We also asked why they would use or not use our app. One of the feedback is "Because the idea of "virtual try on" seems very innovative and interesting, we might be able to see how we would look wearing them instead of waiting for the item to be shipped first. Plus, it's very exclusive for IIUM students so the students can get the item without having to wait for shipping for too long".

Functional Requirement:

- Almost everyone who took part in the survey agreed that the system should be innovative and helpful for the IIUM students who are interested in selling and buying preloved items.
- The system should provide a real-time view of the user trying items virtually through their device's camera.
- The system shall allow the users messaging in the app while notifying users of new messages and updates.

Non-Functional Requirement:

- The app should load the main interface within 3 seconds, and the virtual try on feature should load images within 5 seconds.
- The app should be available 99.9% of the time, except for the scheduled maintenance.
- The app should have a user-friendly and intuitive user interface with minimal guidance on how to use the app.

3.4 LOGICAL DESIGN

3.4.1 System Analysis and Design Diagram

- Use Case diagram

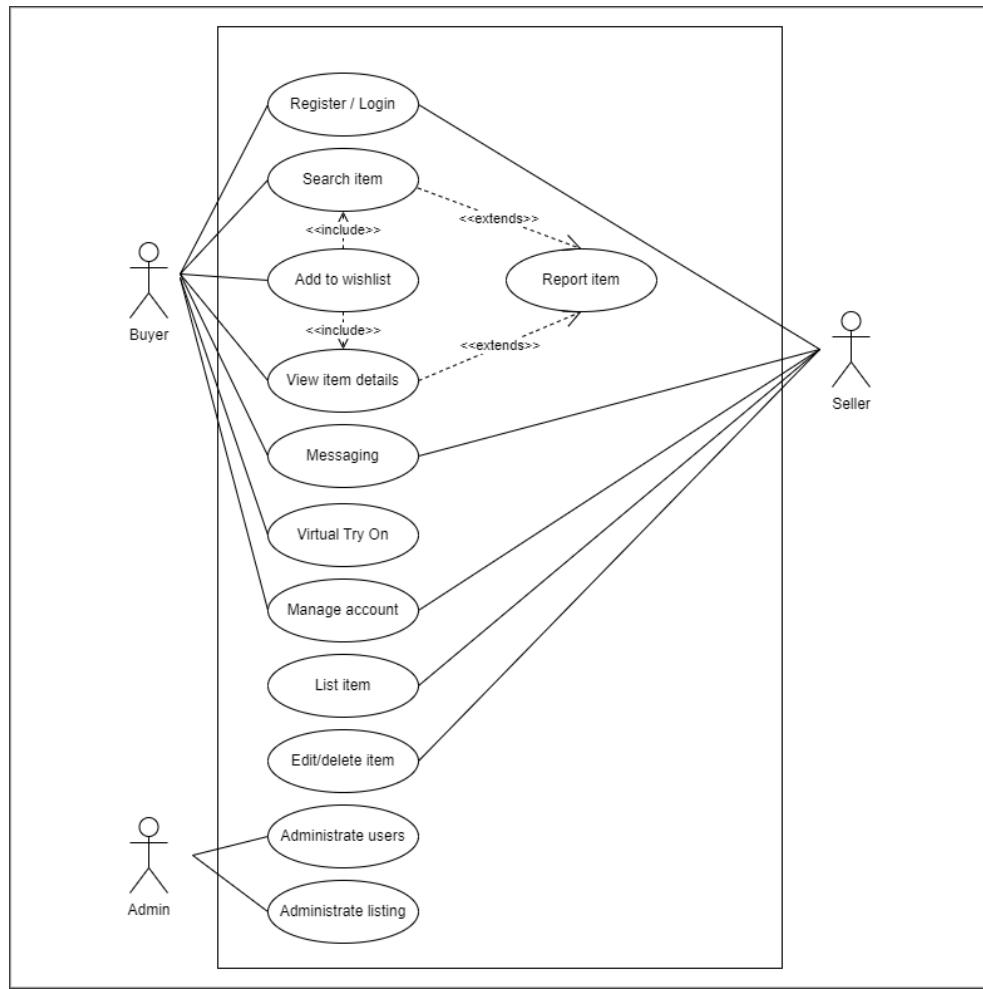


Figure 3.4.1.1 : iLoved's Use Case Diagram

Based on the use case diagram above, there are three actors which are buyer, seller and admin. Buyer and seller can both register/login to their account and messaging for any inquiries about the items sold and manage their account. Buyer can search for an item, view the item's details, add them to the wishlist, report them and virtually try them on while the seller can list, edit or delete the item. Admin can administer users and listing, such as they can ban users or delete items in case of a report.

- Flowchart

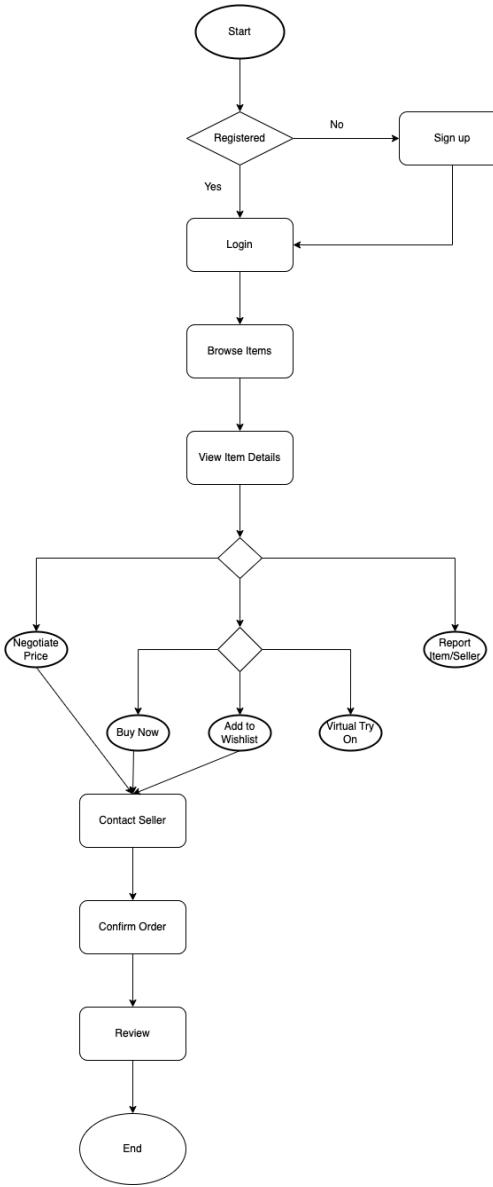


Figure 3.4.1.2: iLoved User's Flowchart

The flowchart above provides a detailed overview of the users' journey within the app from logging in or signing up, browsing items, selecting and interacting with the item details, making a purchase by contacting the sellers, and leaving a review. It also includes various functionalities such as price negotiation, reporting, adding items to the wishlist, and virtual try on.

- Activity Diagram

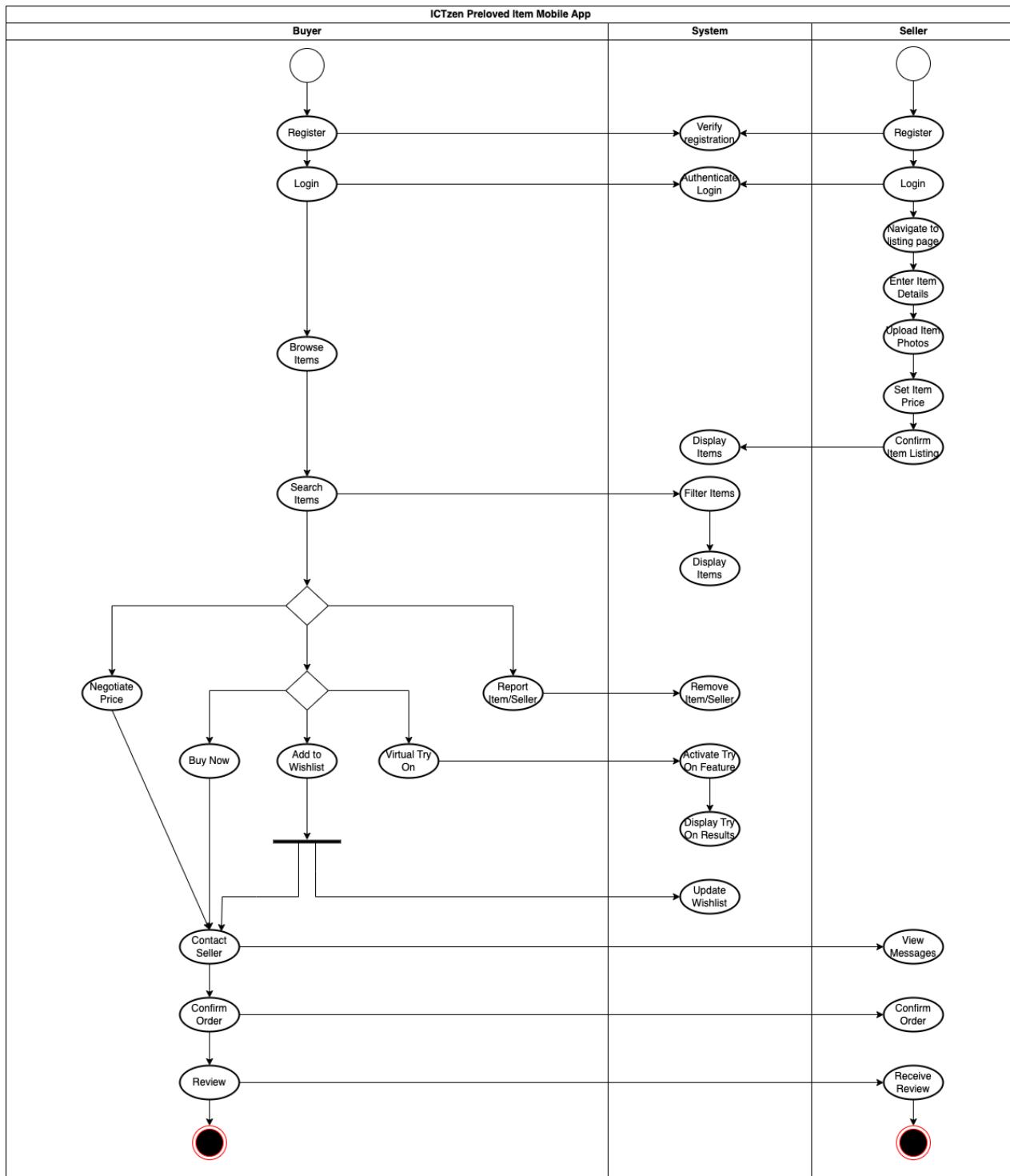


Figure 3.4.1.3: iLoved's Activity Diagram

This activity diagram above represents the workflow and processes within the app, focusing on the interactions of both buyers and sellers, supported by the system. Upon login to the app, the buyer can opt to search for items or browse items by categories. After viewing item's details, buyers can add them to the wishlist, virtually try them on and confirm order by messaging the sellers. Meanwhile for the seller, upon login to the app, they can add, edit or delete items. Lastly, the system checks login credential and item details while also removing user or listing after receiving reports.

- Sequence Diagram

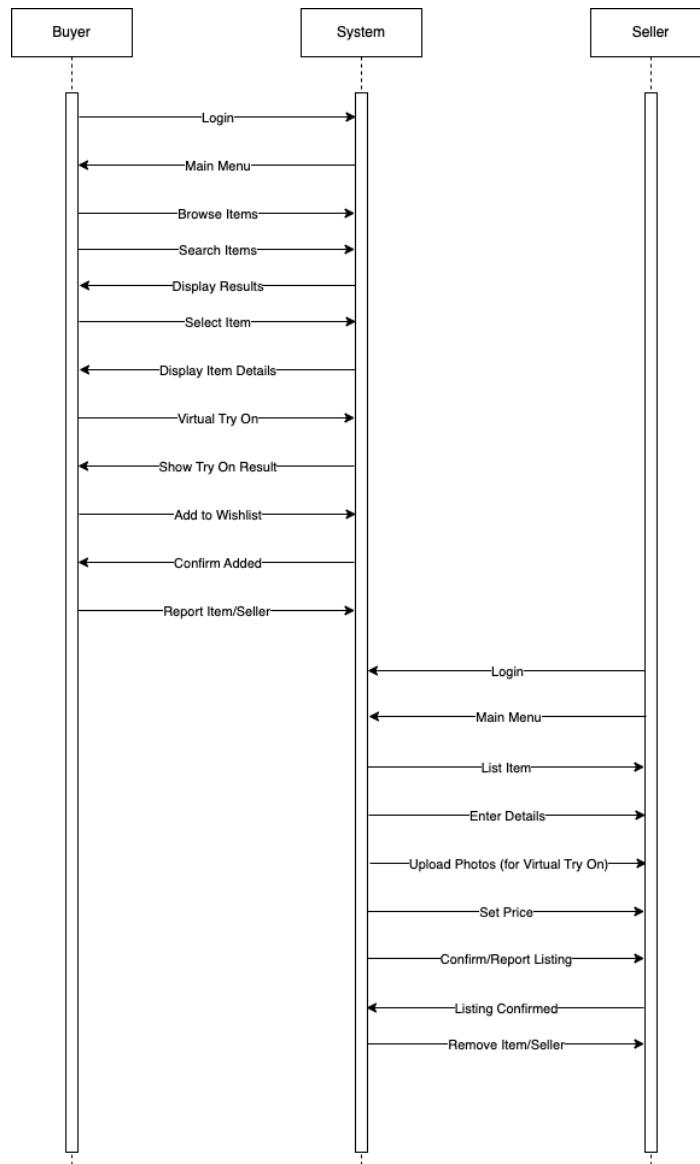


Figure 3.4.1.4: iLoved's Sequence Diagram

This sequence diagram shows the interactions between the buyer and the system, and also the seller and the system. Firstly, both buyers and sellers need to log into the app first before being navigated through the main menu. Next, the buyer can browse or search for an item, view the item's details, virtually try them on, add them to the wishlist and also report them if necessary. Meanwhile, the seller will list the item they want to sell for sale, providing details and uploading photos while also setting a price for it. The system will then confirm the addition of the listing. The listing will be removed once the buyer reports it for being unethical.

- Class Diagram

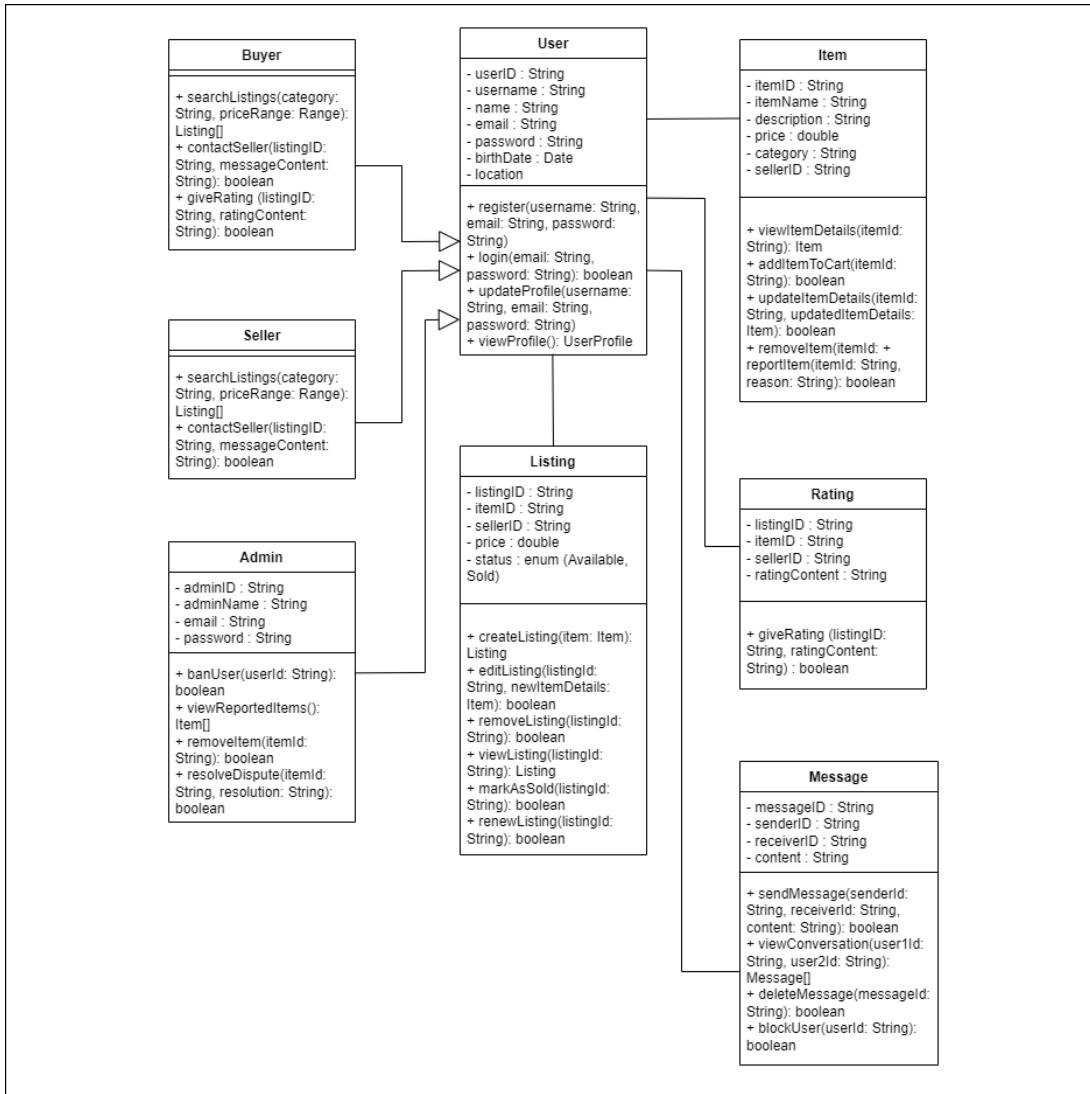


Figure 3.4.1.5: iLoved's Class Diagram

The class diagram provided delineates the relationships among various classes, depicting the interactions involving users, items, messages, reviews, wish lists, virtual try-ons, and listings within the application. Central to this structure is the 'User' class, which serves as a foundational class inherited by specialised classes such as 'Buyer', 'Seller', and 'Admin'. Inheritance from the 'User' class equips the 'Buyer' class with shared attributes and methods, while also incorporating buyer-specific functionalities like 'viewItemDetails()'. Similarly, the 'Seller' class inherits core properties and methods from 'User' but expands its capabilities with unique attributes such as 'sellerRating' and methods tailored for seller activities. This hierarchical arrangement ensures that each class maintains a cohesive structure while accommodating specialised behaviours relevant to different user roles within the app.

3.4.2 Data Flow Diagram

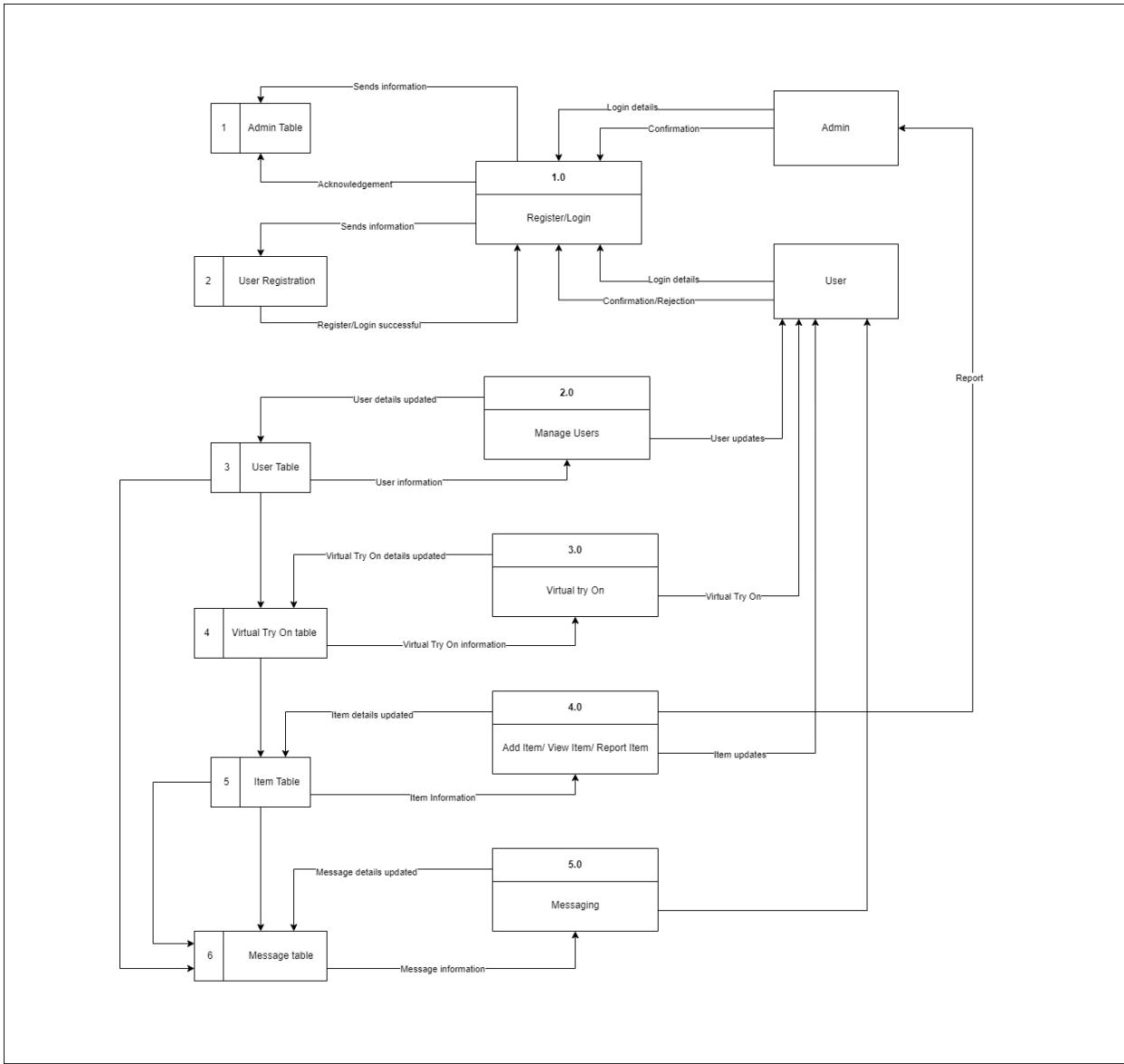


Figure 3.4.2.1: iLoved's Data Flow Diagram

Based on the figure above, the users can register, login, manage their profile, try on items virtually, add/view/report items and communicate through messaging. Admins supervise the system, approving user logins and receiving reports from the users. Each process updates respective tables and communicates back to the users and admin based on the interaction requirements.

3.5 DATABASE DESIGN

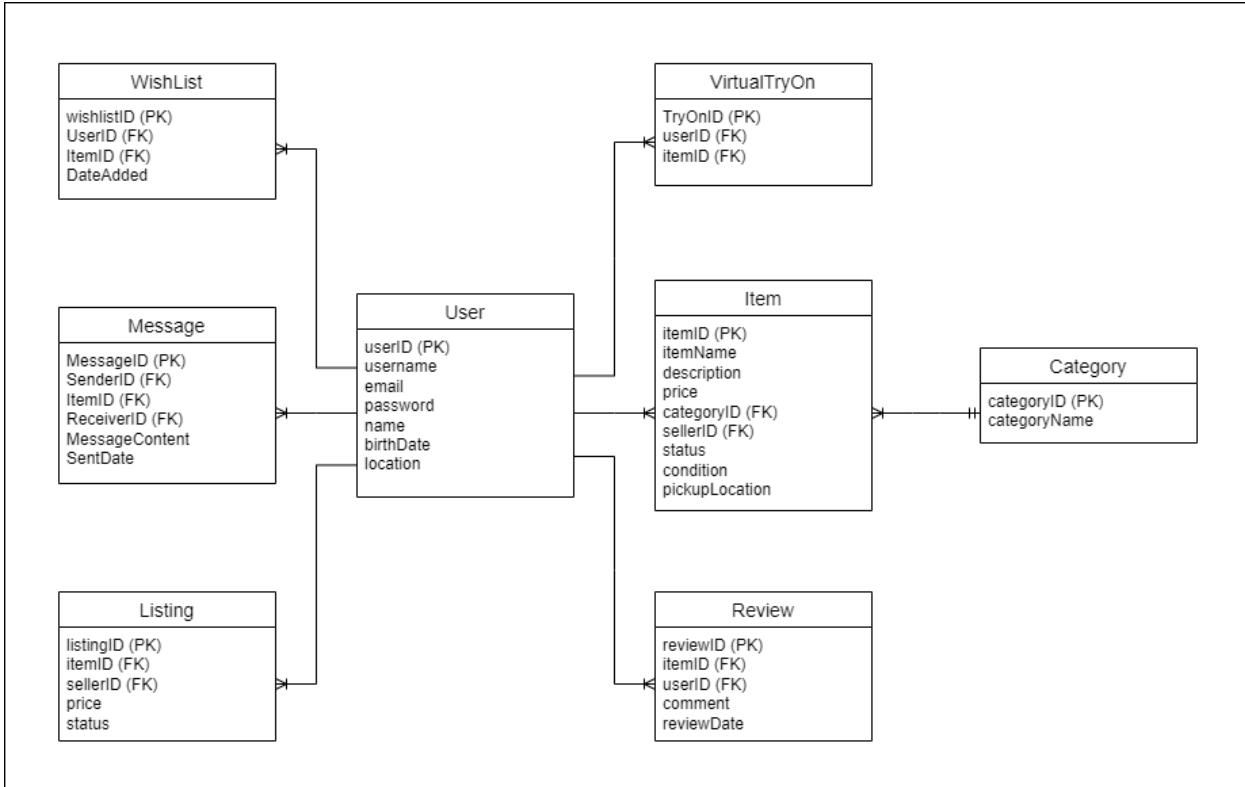


Figure 3.5.1: Entity Relationship Diagram of iLoved

Based on the figure above, users can interact with various items by adding them to wishlists, trying them on virtually, sending messages for any inquiries about the items and also reviewing it. The items are categorised and listed for sale by the sellers. Each entity is uniquely identified by a primary key (PK) and foreign keys (FK) in order to establish relationships between different entities, ensuring referential integrity in the database.

DATA DICTIONARY (METADATA)

Table User

Column	Data Type	Description
userID	VARCHAR2 (20)	Primary key of the table
username	VARCHAR2 (20)	Username of the users
email	VARCHAR2 (100)	User's email
password	VARCHAR2 (50)	User's password
name	VARCHAR2 (100)	User's full name
birthdate	DATE	User's birth date
location	TEXT	User's location

Table 3.5.1: Table User

Table Item

Column	Data Type	Description
itemID	VARCHAR2 (20)	Primary key of the table
itemName	VARCHAR2 (20)	Item name
description	VARCHAR2 (100)	Item's description
price	NUMBER	Item's price
categoryID	VARCHAR2 (100)	Foreign key from Category table
sellerID	NUMBER	Foreign key from User table
status	DATE	A = Available, S = Sold, null = unknown
condition	TEXT	Condition of item

Table 3.5.2: Table Item

Table Message

Column	Data Type	Description
MessageID	VARCHAR2 (20)	Primary key of the table
SenderId	VARCHAR2 (20)	Foreign key from User table
ReceiverID	VARCHAR2 (20)	Foreign key from User table
itemID	VARCHAR2 (20)	Foreign key from Item table
MessageContent	TEXT	Message's content
SentDate	DATE	Date of the message

Table 3.5.3: Table Message

Table Review

Column	Data Type	Description
reviewID	VARCHAR2 (20)	Primary key of the table
itemID	VARCHAR2 (20)	Foreign key from Item table
userID	VARCHAR2 (20)	Foreign key from User table
comment	TEXT	Review's content
reviewDate	DATE	Date of the review

Table 3.5.4: Table Review

Table Virtual Try On

Column	Data Type	Description
TryOnID	VARCHAR2 (20)	Primary key of the table
userID	VARCHAR2 (20)	Foreign key from User table
itemID	VARCHAR2 (20)	Foreign key from Item table

Table 3.5.5: Table Virtual Try On

Table WishList

Column	Data Type	Description
wishlistID	VARCHAR2 (20)	Primary key of the table
userID	VARCHAR2 (20)	Foreign key from User table
itemID	VARCHAR2 (20)	Foreign key from Item table
DateAdded	DATE	Date of the wishlist added

Table 3.5.6: Table WishList

Table Listing

Column	Data Type	Description
listingID	VARCHAR2 (20)	Primary key of the table
sellerID	VARCHAR2 (20)	Foreign key from User table
itemID	VARCHAR2 (20)	Foreign key from Item table
price	NUMBER	Listing's price
status	DATE	A = Available, S = Sold, null = unknown

Table 3.5.7: Table Listing

Table Category

Column	Data Type	Description
categoryID	VARCHAR2 (20)	Primary key of the table
categoryName	VARCHAR2 (20)	Name of the category

Table 3.5.8: Table Category

3.6 USER INTERFACE

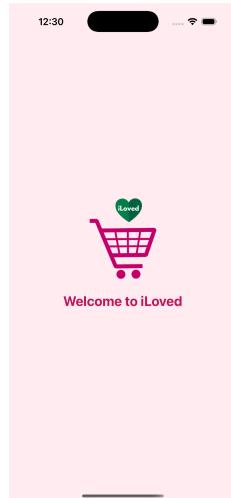


Figure 3.6.1 : Splash Screen

This is the splash screen for the app. The logo is designed specifically for the iLoved application. Within 300ms, the user will enter the login/register page.

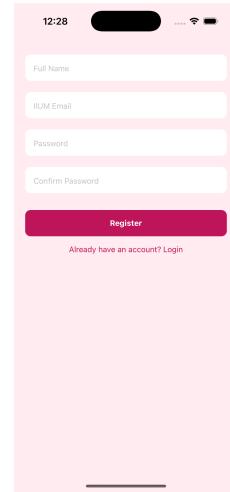


Figure 3.6.2 : Register Page

A new user must register first by clicking the 'Register' button. Then, the user will need to login to their account before being able to use the application.

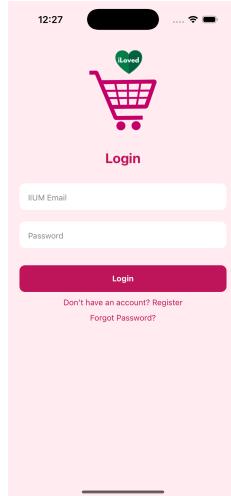


Figure 3.6.3 : Login Page

The user must log into their account to use this application by entering their username and password.

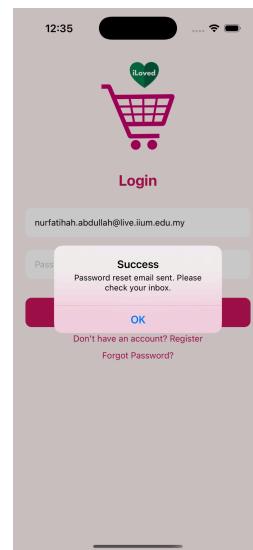


Figure 3.6.4 : Reset Password

The user must enter their email to reset their password. An email will be sent to their account to reset the password.

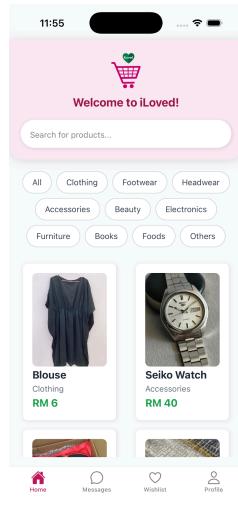


Figure 3.6.5 : Homepage

Upon login, the user will be brought to the homepage where they can search for items or filter the items to their preferences. There is also a navigation bar to lead them to messages, wishlists and their profile.

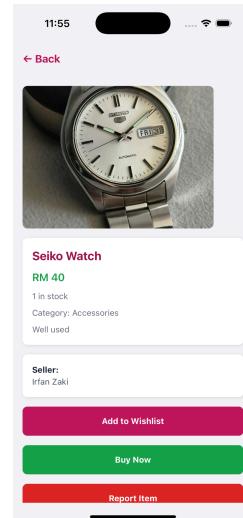


Figure 3.6.6 : Product Page

When the user clicks on the latest product list, it will lead them to the product page. In this page, they can browse the item's images, report the item, add it to the wishlist, try it on virtually, or buy it.

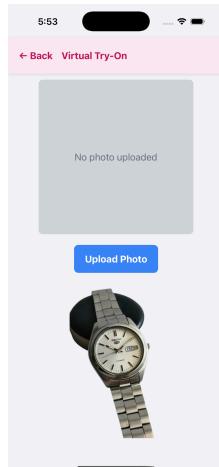


Figure 3.6.7 : Virtual Try On Page

When the user clicks on the hanger icon on the product page, the system will lead the user to this virtual try on page. Users will need to upload a photo of them.

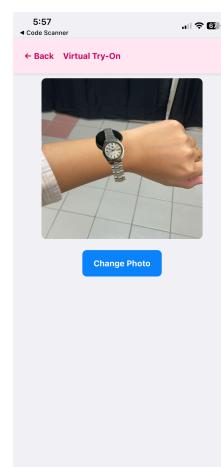


Figure 3.6.8 : Virtual Try On

When they upload a photo of them, they can move, resize, and adjust the product on the photo that they've uploaded. This will show the user how the product will look like on them.

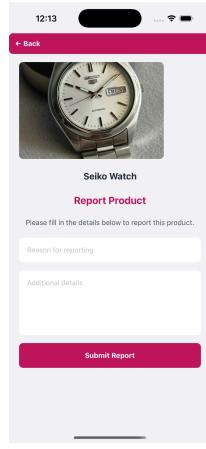


Figure 3.6.9 : Report Page

When the user clicks on the report icon on the product page, the system will lead the user to this report page. The user needs to fill in the form and click the ‘Report’ button to send it to administrators.

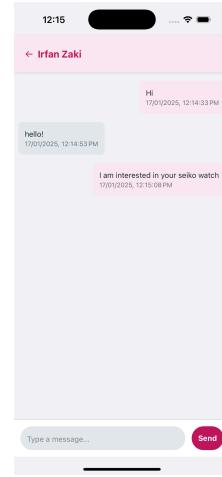


Figure 3.6.10 : Buying Item

When the user clicks on the ‘Buy now’ button on the product page, the system will lead the user to the chat screen.

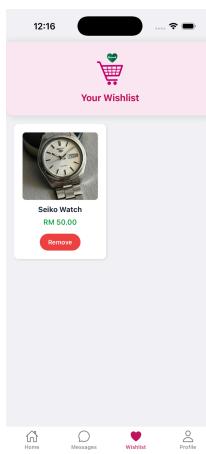


Figure 3.6.11 : Wish List

When the user clicks on the heart icon on the product page or the navigation bar, the system will lead them to the Wish List page.

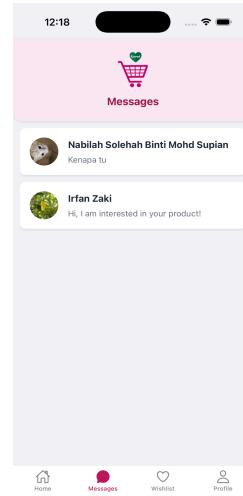


Figure 3.6.12 : Message

When the user clicks on the message icon on the navigation bar, the system will lead them to the Message page.

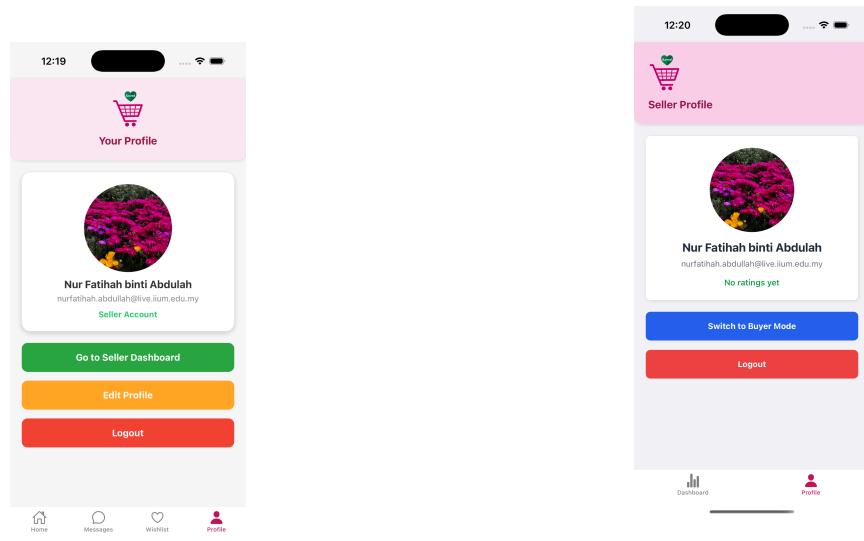


Figure 3.6.13 : Profile Page (Buyer)

When the user clicks on the profile icon on the navigation bar, the system will lead them to the Profile page.

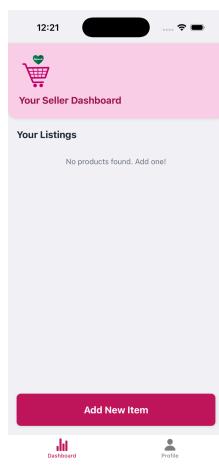


Figure 3.6.15 : Seller Dashboard

This is the Seller Dashboard. This page will list down all the seller's products. There is also a 'Add New Item' button.

This is the profile page for sellers. There is a 'Switch to Buyer Mode' and 'Logout' button.

Figure 3.6.16 : Add New Item

When the seller clicks on the 'Add New Item' button in the Seller Dashboard page, the system will lead them to the 'Add New Item' page. On this page, the seller can add products to be listed in the system.

3.7 SUMMARY

This chapter outlines the comprehensive methodology employed in the development of the iLoved: IIUM Preloved-Item Mobile App. Utilising qualitative methods, data was gathered from IIUM students through convenience sampling using online questionnaires. The rapid prototyping approach was selected to iteratively refine the app based on user feedback, allowing for early issue detection and enhanced communication with stakeholders.

The requirements specification was derived from an online questionnaire targeting IIUM students and staff interested in affordable preloved items. Key findings indicated a strong preference for a user-friendly and informative system, with both functional and non-functional requirements emphasised.

The logical design section includes detailed diagrams, such as system architecture, use case, activity, and class diagrams, illustrating the interactions and workflows within the app. Additionally, the database design is thoroughly documented with metadata tables for users, items, messages, reviews, virtual try-ons, wish lists, listings, and categories.

User interface prototypes are provided, showcasing various screens of the app, including the splash screen, login/register page, homepage, product page, and message feature. These designs ensure an intuitive and seamless user experience, catering to the needs and preferences identified during the requirement gathering phase.

CHAPTER 4: RESULT AND DISCUSSION

4.1 SYSTEM DEVELOPMENT PROCESS (IMPLEMENTATION)

The development of the iLoved mobile application followed a structured approach that incorporated various tools, frameworks and methodologies to ensure a smooth transition from design to deployment. Below are key stages and technologies employed throughout the system development process:

4.1.1 Development Environment

- Backend Development: The backend was implemented using Node.js, a lightweight and efficient JavaScript runtime, which facilitated handling asynchronous operations for smooth system performance.
- Database Management: Firebase was selected for its real-time database capabilities, cloud storage and user authentication, offering seamless integration with the frontend.

4.1.2 Frontend Development

- Framework: React Native was employed for cross-platform mobile application development, enabling compatibility with both Android and iOS devices.
- User Interface: The design aimed to deliver an intuitive and user-friendly experience, leveraging modern design principles.

4.1.3 Virtual Try-On Feature

The virtual try-on feature was a core innovation, implemented in several stages:

- Background Removal: An API-powered background remover was integrated to isolate the item images.
- User Interaction: Users can upload personal images to visualise the fit of preloved items.

- Customisation: The interface allows for dragging, resizing and placing items on the uploaded images, providing a customisable virtual try-on experience.

4.1.4 Deployment Process

- Testing: Rigorous testing phases, including unit testing and user acceptance testing, ensured the functionality and reliability of the system
- Version Control: GitHub was used for version control, facilitating collaboration and code management.
- Deployment: The application was deployed and tested on actual devices to validate cross-platform performance.

4.1.5 Challenges and Resolutions

Several challenges emerged during development, such as integrating the virtual try-on feature and optimising the database performance. These were addressed by:

- Leveraging documentation and community resources for React Native and Firebase.
- Regular consultations and code reviews with experts, including Azmi Basharudin, who provided guidance in React Native development.

Through these tools, frameworks and methods, the iLoved system evolved from a conceptual design into a fully functional product tailored to the needs of IIUM students seeking preloved items.

4.2 IMPLEMENTATION STEPS

4.2.1 Frontend Implementation

The frontend development of iLoved focused on delivering a seamless and intuitive user interface (UI) and an engaging user experience (UX) tailored to IIUM students. The implementation included the following aspects:

1. Design Approach

- a. User-Centric Design: The UI was designed after researching the target audience which are IIUM students. The design emphasised simplicity, clarity and accessibility to ensure ease of navigation for users with varying levels of tech-savviness.
- b. Color Scheme and Theme: A visually appealing color palette was chosen, which is pink while maintaining readability and vibrancy.
- c. Consistency: Components such as buttons, icons, and navigation menus were standardised for a cohesive look and feel across the app.

2. Development Tools and Frameworks

- a. React Native: The app was built using React Native, ensuring cross-platform compatibility for both android and iOS.
- b. UI Libraries: Pre-built UI components from libraries like React Native Elements and NativeBase.

3. Key Features of the UI

- a. Homepage: Displays categories and featured preloved items with a clean and organised layout.
- b. Virtual Try-On Integration: A dedicated section allowing users to virtually try on items, not limited to clothes. The UI for this feature was interactive, with simple instructions for uploading their photos.

- c. Search and Filters: Advanced search functionality with filters like price range and categories to enhance discoverability.
 - d. Item Details Page: An esthetically pleasing and informative layout with clear images, descriptions, seller contact information, and a “Virtual Try-On” button for the virtual try-on.
 - e. Profile Management: A well-structured user profile interface for students to list items, track their sales and communicate with buyers.
4. User Experience Enhancements
- a. Smooth Navigation: Tab-based navigation for quick access to different sections like “Home”, “Message”, “Wishlist” and “Profile”.
 - b. Animations and Feedback: Subtle animations like item selection improved interactivity and user engagement.
5. Interactive Development and Testing
- a. Prototyping: Early-stage wireframes and prototypes were created using Figma to visualise and validate designs.
 - b. User Testing: Feedback from IIUM students was incorporated through usability testing, ensuring the interface met user expectations.
 - c. Performance Optimisation: Efforts were made to minimise UI latency, optimise asset loading and ensure responsiveness across devices.

4.2.2 Backend Implementation

The backend for iLoved was built using Node.js for server-side logic and Firebase for database and authentication services. This streamlined stack ensured rapid development, scalability and tight integration of key functionalities

1. Architecture and Framework
 - a. Framework: The backend was developed using Node.js with Express.js to manage API endpoints

- b. Database: Firebase Cloud Firestore was used as the database, offering a real-time NoSQL solution for storing and synchronising data.
- c. Hosting: Firebase Hosting was utilised for deploying the backend logic.

2. Data Handling

- a. Firestore Collections:
 - i. Users: Stores user details, including name, IIUM live email, profile picture and listed/purchase items.
 - ii. Products: Contains information about each preloved item, such as title, description, price, category, images and condition.
 - iii. Transactions: Track purchase details, including buyer, seller, item ID and timestamps.
- b. Real-Time Updates: Firebase's real-time capabilities were leveraged to update the app dynamically when users add, update or remove items.

3. API Development

- a. End Points: Built using
- b. Authentication:
 - i. Firebase Authentication was used to manage user sign-ups and logins.
 - ii. Supports email/password authentication and integrates seamlessly with Firebase rules for secure access.
- c. Virtual Try-On: APIs are focused on retrieving AR-compatible item data, such as dimensions or textures which the frontend uses for rendering in the virtual environment.

4. Firebase Features

- a. Cloud Firestore:
 - i. Used for storing structured and unstructured data, such as user profiles, item listings and transaction details.

- ii. Indexed queries enable fast searches and filtering by categories and price.
- b. Firebase Storage:
 - i. Handles image uploads for item listings and user profiles.
 - ii. Securely stores media files and generates download URLs for retrieval.
- c. Firebase Cloud Functions: Implements server-side logic, such as:
 - i. Triggering updates to Firestore when a transaction is completed.
 - ii. Sending notifications when new items are listed or messages are received.
- d. Firebase Cloud Messaging (FCM): Used to send push notifications, keeping users informed about app updates, messages and promotions.

5. Business Logic

- a. Item Listing: Users can add new listings with details and images. Firebase Cloud Functions validate and store the data in Firestore.
- b. Search and Filtering: Firestore queries retrieve items based on user-defined filters like category and price range.
- c. User Profiles: Users can view and manage their profiles, including their listed items and purchase history.
- d. Transactions: Buyer and seller details are recorded in a transaction document, ensuring traceability and status tracking.

6. Security

- a. Firebase Rules: Firestore security rules were configured to ensure users can only access or modify their data.
- b. Authentication Tokens: Firebase authentication ensures secure login sessions using ID tokens.
- c. Data Validation: Cloud Functions validate incoming data before storing it in Firestore.

7. Testing and Optimisation

- a. Testing Tools:
 - i. Postman for testing APIs.
 - ii. Firebase Emulator Suite for simulating Firestore and Functions locally.
- b. Optimisation: Indexed FireStore queries for faster data retrieval and used Firebase's free-tier quotas efficiently during development.

4.2.3 Integration

The integration of frontend, backend and database in iLoved was designed to ensure smooth communication between components, real-time updates and a seamless user experience.

1. Frontend and Backend Integration

- a. Technology Stack :
 - i. Frontend: ReactNative for the mobile app. The virtual try-on feature enables previews by uploading a picture of the user and processing it using the API background remover directly from the frontend.
 - ii. Backend: Node.js server using Firebase services.
- b. How Integration Works:
 - i. API Communication:

The frontend communicates with the backend using RESTful APIs implemented with Node.js.
All requests are sent using HTTP and secured with HTTPS.
 - ii. Real-Time Updates:

Firebase's real-time database and Firestore provide real-time synchronisation between the app and the database.
 - iii. Authentication:

Firebase Authentication manages user sign-ins and provides secure tokens and are sent with each API request to verify and authorise users.

2. Backend and Database Integration

- a. Database:
 - i. Firebase Cloud Firestore was used for storing structured data.
 - ii. Firebase Storage was used for handling media files (though for virtual try-on, no photo uploads are used)

- b. How Integration Works
 - i. Data Storage and Retrieval:

The backend interacts with Firestore using the Firebase Admin SDK.
 - ii. Cloud Functions:

Firebase Cloud Functions handle backend logic for database triggers.
 - iii. Security Rules:

Firebase Firestore rules ensure only authorised users can access or modify data.

3. Frontend and Database Direct Integration

- a. Authentication:
 - i. Users log in or register directly through Firebase Authentication.
 - ii. The frontend retrieves user tokens and uses them to access secure features.

- b. Real-Time Data Sync:
 - i. The frontend subscribes to Firestore changes for real-time updates.
 - ii. Example: New listings appear instantly in the app when other users add them.

4. Virtual Try-On Feature Integration

- a. Frontend and Photo Upload:
 - i. Users upload their photo through the React Native app.

- ii. The system processes the item's picture using API background remover to remove the background.
- b. User Interaction:
 - i. After uploading their picture, users can drag the item onto their picture and resize it to visualise how the item looks like on them.
 - ii. This interactive feature enhances user engagement and provides a personalised virtual try-on experience.
- c. Backend Role:
 - i. The backend facilitates secure storage of uploaded photos and processed item images in Firebase Storage.
 - ii. Processing of background removal for item pictures is handled by integrated API, while the frontend manages users' interactions.

5. System Testing and Debugging

- a. Integration Tests: Ensured all components worked together using tools like Postman and Firebase Emulator Suite.
- b. Error Handling:
 - i. Frontend displayed user-friendly error messages for API or database failure.
 - ii. Backend logs error and issues retries for transient database issues.

6. Deployment Workflow

- a. Frontend: Built and deployed using tools like Expo.
- b. Backend and database: Hosted on Firebase, leveraging its scalability and real-time capabilities.

4.3 TYPES OF TESTING

4.3.1 Unit Testing

Unit testing focuses on testing individual functions, classes or methods in isolation to ensure they work as expected.

1. Backend Unit Testing

- a. Tools Used: Jest and Firebase Emulator Suite for simulating and testing Firebase Cloud Functions in a local environment.
- b. Ensuring proper data validation and error handling in Firebase Cloud Functions.

2. Frontend Unit Testing

- a. Tool Used: Jest and React testing Library for rendering UI components and validating their behavior in different scenarios.
- b. Testing UI components like buttons or forms to ensure they render correctly.

4.3.2 Integration Testing

Integration testing ensures that different modules or components work together correctly.

1. Frontend and Backend Integration:

- a. Testing Tools: Postman for manual testing, or automated tests using Supertest with Node.js
- b. For example: Simulating a user fetching item listings and verifying the response renders correctly in the app.

2. Backend and Database Integration

- a. Verifying the backend correctly stores and retrieves data from Firebase Firestore.
- b. For example: Testing a Cloud Function trigger to update item availability when a transaction is made.

3. End-to-End Integration:

- a. Using tools like Cypress or Detox to test the flow
- b. For example: A user lists a new item > Backend stores the item > Item appears in the frontend listing in real time.

4.3.3 System Testing

1. Test Scenarios:
 - a. End-to-end workflows were tested, such as: A user logs in > Lists an item > Another user views the item > Completes a transaction.
 - b. Virtual try-on feature: Ensure camera integration works across different devices and AR overlays appear accurately.
2. Performance Testing:
 - a. Tools used: Firebase Emulator Suite for testing Firestore performance.
 - b. Example: Measuring response time for fetching 100+ items from the database.
3. Device Compatibility:
 - a. Tested the app on multiple devices, both Android and iOS to ensure compatibility with different screen sizes and operation systems.
4. Security Testing:
 - a. Ensured that only authenticated users could access certain routes and modify their own data, using Firebase Authentication.

4.3.4 User Acceptance Testing (UAT)

UAT ensures the application meets user expectations and is ready for deployment.

1. End User Participation:
 - a. Conducted sessions with IIUM students (target users)
 - b. Users were asked to:
 - i. Create profiles
 - ii. List and browse items
 - iii. Test the virtual try-on feature
2. Feedback Collection:
 - a. Users provided feedback on UI/UX, performance and feature usability.
 - b. Example feedback:
 - i. The UI is so beautiful and cute.
 - ii. It would be nicer if the virtual try-on is interactive to the user's movements.
3. Iteration Based on Feedback:
 - a. Improvements were made to address user-reported issues, such as:
 - i. Enhancing real-time synchronisation for item availability.
 - ii. Refining the visual design of the item details screen.

4.4 TEST CASES

Test Case 1: Registration with Valid Input

Test Case ID	iLoved_Reg_001		
Related Feature ID	F001		
Objective	Verify successful user registration		
Covered Test Coverage Items			
Steps	Expected Result	Actual Result	Pass/Fail
1. Click on “Do not have an account? Register” 2. Fill in the form using a valid IIUM live email and password. 3. Click the ‘Register’ button	Registration is successful, and a verification email is sent to the user.	Registration is successful, and a verification email is sent to the user.	Pass

Table 4.4.1: Test Case 1

Test Case 2: Registration with Duplicate Email

Test Case ID	iLoved_Reg_002		
Related Feature ID	F001		
Objective	Verify registration fails with duplicate email		
Covered Test Coverage Items			
Steps	Expected Result	Actual Result	Pass/Fail
1. Click on “Do not have an account? Register” 2. Fill in the form using a registered IIUM live email and password. 3. Click the ‘Register’ button	Registration fails, and an error message appears: “Email already registered”.	Registration fails, and an error message appears: “Email already registered”.	Pass

Table 4.4.2: Test Case 2

Test Case 3: Registration with non-IIUM Live Email

Test Case ID	iLoved_Reg_003		
Related Feature ID	F001		
Objective	Verify registration fails when using a non-IIUM email (e.g. Gmail).		
Covered Test Coverage Items	Email validation for IIUM domain only		
Steps	Expected Result	Actual Result	Pass/Fail
1. Click on “Do not have an account? Register” 2. Fill in the form using non-IIUM live email and password. 3. Click the ‘Register’ button	Registration fails, and an error message appears: “Please use a valid IIUM live email”.	Registration fails, and an error message appears: “Please use a valid IIUM live email”.	Pass

Table 4.4.3: Test Case 3

Test Case 4: Login with Valid Credentials

Test Case ID	iLoved_Login_001		
Related Feature ID	F002		
Objective	Verify that valid credentials allow users to login successfully.		
Covered Test Coverage Items			
Steps	Expected Result	Actual Result	Pass/Fail
1. Fill in the form using a registered live email 2. Put the correct password 3. Click the ‘Login’ button	System successfully logs in the user and redirects to the home page.	System successfully logs in the user and redirects to the home page.	Pass

Table 4.4.4: Test Case 4

Test Case 5: Login with Invalid Password

Test Case ID	iLoved_Login_002		
Related Feature ID	F002		
Objective	Verify login fails with an incorrect password		
Covered Test Coverage Items			
Steps	Expected Result	Actual Result	Pass/Fail
1. Fill in the form using a registered live email 2. Put the incorrect password 3. Click the 'Login' button	Login fails and an error message appears: "Incorrect Password."	Login fails and an error message appears: "Incorrect Password."	Pass

Table 4.4.5: Test Case 5

Test Case 6: Login with Unregistered Username

Test Case ID	iLoved_Login_003		
Related Feature ID	F002		
Objective	Verify login fails with an unregistered username		
Covered Test Coverage Items			
Steps	Expected Result	Actual Result	Pass/Fail
1. Fill in the form using a non-registered live email 2. Click the 'Login' button	Login fails and an error message appears: "Username not registered."	None	None

Table 4.4.6: Test Case 6

Test Case 7: Verify Homepage Search Functionality

Test Case ID	iLoved_Home_001		
Related Feature ID	F003		
Objective	Verify that the search bar on the homepage works correctly		
Covered Test Coverage Items	Search functionality		
Steps	Expected Result	Actual Result	Pass/Fail
User enters a keyword (e.g. “kemeja”) into the search bar and presses search.	Relevant items (e.g. “kemeja”) appears in the search results.	None	None

Table 4.4.7: Test Case 7

Test Case 8: Verify Sending a Message

Test Case ID	iLoved_Msg_001		
Related Feature ID	F004		
Objective	Verify that a user can send a message successfully.		
Covered Test Coverage Items	Message sending functionality		
Steps	Expected Result	Actual Result	Pass/Fail
1. User opens a chat, types “Hi, is this item still available?” 2. click Send.	Message is sent successfully and appears in the chat window.	Message is sent successfully and appears in the chat window.	Pass

Table 4.4.8: Test Case 8

Test Case 9: Verify Adding an Item to Favorite

Test Case ID	iLoved_Wishlist_001		
Related Feature ID	F005		
Objective	Verify that a user can add an item to their favorites list.		
Covered Test Coverage Items	Wishlist functionality		
Steps	Expected Result	Actual Result	Pass/Fail
1. User clicks on the “Add to Wishlist” button for a preloved item in the homepage.	The item is added to the wishlist and appears on the wishlist page	The item is added to the wishlist and appears on the wishlist page	Pass

Table 4.4.9: Test Case 9

Test Case 10: Verify Removing an Item from Favorites

Test Case ID	iLoved_Wishlist_002		
Related Feature ID	F005		
Objective	Verify that a user can remove an item from their favorites list.		
Covered Test Coverage Items	Favorite removal functionality		
Steps	Expected Result	Actual Result	Pass/Fail
1. User navigates to the wishlist page 2. User clicks the “Remove”	The item is removed from the wishlist and no longer appears on the wishlist page.	The item is removed from the wishlist and no longer appears on the wishlist page.	Pass

Table 4.4.10: Test Case 10

Test Case 11: Verify Item Background Removed for Virtual Try-On

Test Case ID	iLoved_VTO_001		
Related Feature ID	F006		
Objective	Verify that the item's background is removed for virtual try-on		
Covered Test Coverage Items			
Steps	Expected Result	Actual Result	Pass/Fail
1. Click on an item in the Homepage. 2. Click the 'Virtual Try-On' button.	The API background remover removes the item's background and an 'Upload Photo' button is shown.	The API background remover removes the item's background and an 'Upload Photo' button is shown.	Pass

Table 4.4.11: Test Case 11

Test Case 12: Verify Upload Photo in Virtual Try-On

Test Case ID	iLoved_VTO_002		
Related Feature ID	F006		
Objective	Verify that the user's photo can be uploaded into the VTO page.		
Covered Test Coverage Items			
Steps	Expected Result	Actual Result	Pass/Fail
1. Click the 'Upload Photo' button. 2. Choose a photo.	The photo is uploaded and the item can be moved around the photo.	The photo is uploaded and the item can be moved around the photo.	Pass

Table 4.4.12: Test Case 12

Test Case 13: Verify Product Information Display

Test Case ID	iLoved_ProductCard_001		
Related Feature ID	F007		
Objective	Verify that all product details are displayed correctly on the product card.		
Covered Test Coverage Items	Product Details Display		
Steps	Expected Result	Actual Result	Pass/Fail
1. Navigate to a product card (e.g. Blouse)	The product card displays: 1. Product image (s) 2. Product name 3. Price 4. Seller Details 5. Description and details of product (e.g. color, size) 6. Interaction buttons: Buy Now, Report Item, Add to Wishlist and virtual try-on	The product card displays: 1. Product image (s) 2. Product name 3. Price 4. Seller Details 5. Description and details of product (e.g. color, size) 6. Interaction buttons: Buy Now, Report Item, Add to Wishlist and virtual try-on	Pass

Table 4.4.13: Test Case 13

Test Case 14: Verify “Buy Now” button Functionality

Test Case ID	iLoved_ProductCard_002		
Related Feature ID	F007		
Objective	Verify that clicking the ‘Buy Now’ button navigates the user to the chat.		
Covered Test Coverage Items	Button interaction		
Steps	Expected Result	Actual Result	Pass/Fail
1. Click the ‘Buy Now’ button	The app navigates to the chat screen where the buyer can chat with the seller.	The app navigates to the chat screen where the buyer can chat with the seller.	Pass

Table 4.4.14: Test Case 14

Test Case 15: Verify Report Item Functionality

Test Case ID	iLoved_Report_001		
Related Feature ID	F008		
Objective	Verify that users can report a product and that the report is sent to admins successfully.		
Covered Test Coverage Items	Form Validation, Submission, Feedback		
Steps	Expected Result	Actual Result	Pass/Fail
1. Click on the ‘Report Item’ button. 2. Fill in the Report Item form (issue, description and optional attachments) 3. click the ‘Report’ button	The system sends the report to the admin team and a confirmation message is displayed: “Your report has been sent to our admins. We will update you on the issue. Thank you.”	The system sends the report to the admin team and a confirmation message is displayed: “Your report has been sent to our admins. We will update you on the issue. Thank you.”	Pass

Table 4.4.15: Test Case 15

Test Case 16: Verify “Log Out” button Functionality

Test Case ID	iLoved_Logout_001		
Related Feature ID	F009		
Objective	Verify that the user can log out successfully		
Covered Test Coverage Items	Logout functionality		
Steps	Expected Result	Actual Result	Pass/Fail
1. User taps in the ‘Log Out’ option from the profile page	The user is logged out successfully and redirected to the login page	The user is logged out successfully and redirected to the login page	Pass

Table 4.4.20: Test Case 16

Test Case 17: Verify Switch to Seller Mode Functionality

Test Case ID	iLoved_Switch_001		
Related Feature ID	F010		
Objective	Verify that the “Seller Mode” button allows a buyer to transition to seller mode seamlessly		
Covered Test Coverage Items	Button Functionality, UI updates, Database State Changes		
Steps	Expected Result	Actual Result	Pass/Fail
1. Click the ‘Seller Mode’ button on the profile page	The user is switched to seller mode and profile UI updates to reflect seller options and the backend database updates the user's role to ‘Seller’.	The user is switched to seller mode and profile UI updates to reflect seller options and the backend database updates the user's role to ‘Seller’.	Pass

Table 4.4.17: Test Case 17

Test Case 18: Verify Add Product as Seller

Test Case ID	iLoved_AddProduct_001		
Related Feature ID	F011		
Objective	Verify that a seller can successfully add a product, and the product appears in the product catalog and seller’s inventory.		
Covered Test Coverage Items	Form Validation, Image Upload, Database Updates, UI Feedback		
Input	Expected Result	Actual Result	Pass/Fail
1. Seller click on the ‘Add Item’ icon 2. fill in the form with valid data 3. submit it	The product appears in the seller’s inventory and is visible to buyers in the product catalog.	The product appears in the seller’s inventory and is visible to buyers in the product catalog.	Pass

Table 4.4.18: Test Case 18

CHAPTER 5: CONCLUSION

5.1 SUMMARY OF SYSTEM DEVELOPMENT

The development of the iLoved application followed a structured life cycle that encompassed design, implementation and testing phases. The project aimed to create a user-friendly platform for IIUM students to buy and sell preloved items, with a standout feature allowing virtual try-ons.

5.1.1 Key Development Milestones

1. Design phase
 - a. Requirements gathering and system architecture planning.
 - b. Designing an intuitive user interface to ensure a seamless user experience.
2. Implementation Phase
 - a. Backend Development: Implementation of backend logic using Node.js and Firebase to handle user data, authentication and real-time updates.
 - b. Frontend Development: Integration of React Native for cross-platform compatibility.
 - c. Virtual Try-On Feature: Successfully developed and integrated a custom feature leveraging an API background remover to provide users with a drag-and-resize experience for visualising item fit.
3. Testing Phase:
 - a. Conducted unit testing for both frontend UI components and backend logic to ensure robust functionality.
 - b. Carried out user acceptance testing to validate the app's usability and performance.

5.1.2 Significant Achievements

1. Virtual Try-On Integration: Implemented the background remover API for a unique virtual fitting experience.
2. Cross Platform Compatibility: Ensured consistent user experience on Android and iOS devices.
3. Technical Challenges Overcome: Address hurdles related to database performance and API integration, enhancing overall system efficiency and reliability.

These milestones marked significant progress in transforming iLoved from a conceptual design into a functional and user-oriented platform tailored to the needs of the IIUM community.

5.2 EVALUATION OF PROJECT SUCCESS

5.2.1 Achievements

1. Functional App Deployment
 - a. Successfully developed and deployed the iLoved mobile app, tailored to IIUM students
 - b. Users can browse, list and purchase preloved items seamlessly.
2. User-Friendly Design
 - a. Achieved a clean, intuitive UI/UX with React Native ensuring ease of use for diverse students.
3. Firebase Integration
 - a. Implemented Firebase for real-time updates, authentication and secure data storage.
 - b. Enable smooth user experiences with minimal latency.
4. Feedback-Driven Improvements

- a. Conducted User Acceptance Testing (UAT) with IIUM students and iterated on feedback to enhance the app.
5. Virtual Try-On
- a. Successfully implemented API background remover and photo uploads for this special feature, allowing users to preview how the item would look like on them.

5.2.2 Challenges Overcame

1. Real-Time Data Synchronisation
 - a. Challenge: Managing real-time updates for item listings and transactions.
 - b. Solution: Leveraged Firebase's real-time database and Firestore for smooth synchronisation.
2. Device Compatibility
 - a. Challenge: Ensuring the app worked well on a variety of Android and iOS devices.
 - b. Solution: Conducted extensive testing across devices and adjusted the design for varying screen sizes.
3. Ensuring Secure Transactions
 - a. Challenge: Protecting user data and transactions from unauthorised access.
 - b. Solution: Applied Firebase Authentication and strict Firestore security rules to safeguard user information.
4. Virtual Try On
 - a. Challenge: Limited resources on augmented reality.
 - b. Solution: Implemented API background remover and photo uploads to see how the color of the item goes with the skin tones and room color.

5.2.3 Project Goals Met

	Goal	Outcome
Primary Goals	Create a platform for IIUM students to sell and buy preloved items conveniently.	Fully achieved with features like item browsing, listing and transaction support.
	Provide a virtual try-on experience.	Achieved using API background remover and photo uploads, enhancing user trust in style.
Performance and Scalability	Ensure the app performs efficiently with real-time updates and is scalable for future use.	Firebase integration enabled real-time updates and seamless performance, meeting scalability requirements.
User Experience	Offer a user-friendly, visually appealing app.	Achieved through thoughtful UI/UX design and incorporating user feedback during UAT.
Project Completion	Deliver the app within the planned timeline.	Successfully met project deadlines, delivering a functional app with all major features except virtual try-on.

Table 5.2.3.1: Project Goals Met

5.3 LIMITATIONS OF THE SYSTEM

The current version of iLoved has no in-app payment feature, requiring users to arrange payments through external platforms or in person. This not only adds inconvenience to the users but also raises concerns about the security and reliability of transactions. However, payment in person helps the buyer to verify the item's condition before making payment, making it easier to cancel the transaction on the spot.

Other than that, the virtual try-on feature is currently using API background remover.. This limits the feature's interactivity, as it lacks real-time adjustments or augmented reality capabilities. This may lead to a less engaging user experience, especially those who seek a more dynamic and realistic preview of how items look like.

5.4 RECOMMENDATIONS FOR FUTURE WORK

The iLoved app has significant potential to grow beyond what it is right now. Expanding its user base beyond IIUM gradually will unlock the full potential of iLoved. This would not only increase the pool of buyers and sellers, but also enhance the variety and volume of preloved items available on the platform.

While the current version of iLoved successfully implemented the virtual try-on feature using API background remover, future work could focus on enhancing the feature by using augmented reality (AR). Integrating AR could allow users to see items in real-time on live camera feed, creating a more immersive experience.

Lastly, in-app payments would also enable advanced features, such as escrow services to hold funds until the buyer confirms receipt of the item, including disputers and fostering trust between users. This feature would position iLoved as a comprehensive and professional marketplace for preloved items other than improving the overall users' shopping experiences.

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APPENDIX A

1. Gender *

Mark only one oval.

- Female
 Male

2. Study Level *

Mark only one oval.

- Level 1
 Level 2
 Level 3
 Level 4
 Alumni
 Staff
 Non-IIUM

3. Kuliyah *

Mark only one oval.

- AIHAS KIRKHS
 AIKOL
 CELPAD
 KAEAD
 KENMS
 KICT
 KOE
 KOED
 N/A

4. How often do you go to thrift shops? *

Mark only one oval.

- Once a month
 Twice a month
 Once a year
 Twice a year
 Never

5. Do you use the group "PRELOVED ITEM (SISTER)" *

Mark only one oval.

- Yes
 No

6. If yes, what is the weakness of the Whatsapp group?

Mark only one oval.

7. Do you wish brothers have the same group? *

Mark only one oval.

- Yes
 No
 Maybe

8. Have you used Carousell before? *

Mark only one oval.

- Yes
 No

9. If yes, what is the weakness of Carousell?

10. Have you used Souq IIUM before? *

Mark only one oval.

- Yes
 No

11. If yes, what is the weakness of SOUQ IIUM?

12. Have you used Mudah.my before? *

Mark only one oval.

- Yes
 No

13. If yes, what is the weakness of Mudah.my

14. If we come up with a mobile app that assist IIUM students selling and buying preloved items with a feature called 'Virtual Try On', will you use it? *

Virtual Try On : an augmented reality where you can see how the clothes look like on you. For example, Snapchat filter.

Mark only one oval.

- Yes
 No
 Maybe

15. State why would you use/ not use it? *

APPENDIX B

1. UAT 1

1318D: USER ACCEPTANCE TEST					
Test designed by: Hadura Fairuzza (2113584), Nur Fatihah (2115778)					
Test executed by: Nursoleha binti Zaimatul Zamri					
Test execution date: 1 January 2025					
Test Case	Test Step	Expected Result	Actual Result	Pass/Fail	Remarks
Test Case 1: Registration with Valid Input	1. Click on "Do not have an account? Register" 2. Fill in the form using a valid IIUM live email and password. 3. Click the 'Register' button	Registration is successful, and a verification email is sent to the user.	As expected	Pass	
Test Case 2: Registration with Duplicate Email	1. Click on "Do not have an account? Register" 2. Fill in the form using a registered IIUM live email and password. 3. Click the 'Register' button	Registration fails, and an error message appears: "Email already registered".	As expected	Pass	
Test Case 3: Registration with non-IIUM Live Email	1. Click on "Do not have an account? Register" 2. Fill in the form using non-IIUM live email and password. 3. Click the 'Register' button	Registration fails, and an error message appears: "Please use a valid IIUM live email".	As expected	Pass	
Test Case 4: Login with Valid Credentials	1. Fill in the form using a registered live email 2. Put the correct password 3. Click the 'Login' button	System successfully logs in the user and redirects to the home page.	As expected	Pass	
Test Case 5: Login with Invalid Password	1. Fill in the form using a registered live email 2. Put the incorrect password 3. Click the 'Login' button	Login fails and an error message appears: "Incorrect Password."	As expected	Pass	
Test Case 6: Login with Unregistered Username	1. Fill in the form using a non-registered live email 2. Click the 'Login' button	Login fails and an error message appears: "Username not registered."	As expected	Pass	
Test Case 7: Verify Homepage Search Functionality	User enters a keyword (e.g., "kemeja") into the search bar and presses search.	Relevant items (e.g., "kemeja") appear in the search results.	As expected	Pass	
Test Case 8: Verify Sending a Message	1. User opens a chat, types "Hi, is this item still available?" 2. click Send.	Message is sent successfully and appears in the chat window.	As expected	Pass	
Test Case 9: Verify Adding an Item to Favorite	1. User clicks on the "Add to Wishlist" button for a preloved item in the homepage.	The item is added to the wishlist and appears on the wishlist page	As expected	Pass	
Test Case 10: Verify Removing an Item from Favorites	1. User navigates to the wishlist page 2. User clicks the "Remove"	The item is removed from the wishlist and no longer appears on the wishlist page.	As expected	Pass	
Test Case 11: Verify Item	1. Click on an item in the Homepage.	The API background remover removes the	As expected	Pass	

Background Removed for Virtual Try-On	2. Click the ‘Virtual Try-On’ button.	item's background and an ‘Upload Photo’ button is shown.			
Test Case 12: Verify Upload Photo in Virtual Try-On	1. Click the ‘Upload Photo’ button. 2. Choose a photo.	The photo is uploaded and the item can be moved around the photo.	As expected	Pass	
Test Case 13: Verify Product Information Display	1. Navigate to a product card (e.g. Blouse)	The product card displays: 1. Product image (s) 2. Product name 3. Price 4. Seller Details 5. Description and details of product (e.g. color, size) 6. Interaction buttons: Buy Now, Report Item, Add to Wishlist and virtual try-on	As expected	Pass	
Test Case 14: Verify “Buy Now” button Functionality	1. Click the ‘Buy Now’ button	The app navigates to the chat screen where the buyer can chat with the seller.	As expected	Pass	
Test Case 15: Verify Report Item Functionality	1. Click on the ‘Report Item’ button. 2. Fill in the Report Item form (issue, description and optional attachments)	The system sends the report to the admin team and a confirmation message is displayed: “Your	As expected	Pass	

	3. click the ‘Report’ button	report has been sent to our admins. We will update you on the issue. Thank you.”			
Test Case 16: Verify “Log Out” button Functionality	1. User taps in the ‘Log Out’ option from the profile page	The user is logged out successfully and redirected to the login page	As expected	Pass	
Test Case 17: Verify Switch to Seller Mode Functionality	1. Click the ‘Seller Mode’ button on the profile page	The user is switched to seller mode and profile UI updates to reflect seller options and the backend database updates the user's role to ‘Seller’.	As expected	Pass	
Test Case 18: Verify Add Product as Seller	1. Seller click on the ‘Add Item’ icon 2. fill in the form with valid data 3. submit it	The product appears in the seller's inventory and is visible to buyers in the product catalog.	As expected	Pass	

2. UAT 2

1318D: USER ACCEPTANCE TEST					
Test designed by: Hadura Fairuzza (2113584), Nur Fatihah (2115778)					
Test executed by: Nurul Athirah binti Rosdi					
Test execution date: 1 January 2025					
Test Case	Test Step	Expected Result	Actual Result	Pass/Fail	Remarks
Test Case 1: Registration with Valid Input	1. Click on “Do not have an account? Register” 2. Fill in the form using a valid IIUM live email and password. 3. Click the ‘Register’ button	Registration is successful, and a verification email is sent to the user.	Same	Pass	
Test Case 2: Registration with Duplicate Email	1. Click on “Do not have an account? Register” 2. Fill in the form using a registered IIUM live email and password. 3. Click the ‘Register’ button	Registration fails, and an error message appears: “Email already registered”.	Same	Pass	
Test Case 3: Registration with non-IIUM Live Email	1. Click on “Do not have an account? Register” 2. Fill in the form using non-IIUM live email and password. 3. Click the ‘Register’ button	Registration fails, and an error message appears: “Please use a valid IIUM live email”.	Same	Pass	
Test Case 4: Login with Valid Credentials	1. Fill in the form using a registered live email 2. Put the correct password 3. Click the ‘Login’ button	System successfully logs in the user and redirects to the home page.	Same	Pass	
Test Case 5: Login with Invalid Password	1. Fill in the form using a registered live email 2. Put the incorrect password 3. Click the ‘Login’ button	Login fails and an error message appears: “Incorrect Password.”	Same	Pass	
Test Case 6: Login with Unregistered Username	1. Fill in the form using a non-registered live email 2. Click the ‘Login’ button	Login fails and an error message appears: “Username not registered.”	Same	Pass	
Test Case 7: Verify Homepage Search Functionality	User enters a keyword (e.g. “kemeja”) into the search bar and presses search.	Relevant items (e.g. “kemeja”) appear in the search results.	Same	Pass	
Test Case 8: Verify Sending a Message	1. User opens a chat, types “Hi, is this item still available?” 2. click Send.	Message is sent successfully and appears in the chat window.	Same	Pass	
Test Case 9: Verify Adding an Item to Favorite	1. User clicks on the “Add to Wishlist” button for a preloved item in the homepage.	The item is added to the wishlist and appears on the wishlist page	Same	Pass	
Test Case 10: Verify Removing an Item from Favorites	1. User navigates to the wishlist page 2. User clicks the “Remove”	The item is removed from the wishlist and no longer appears on the wishlist page.	Same	Pass	
Test Case 11: Verify Item	1. Click on an item in the Homepage.	The API background remover removes the	Same	Pass	

Background Removed for Virtual Try-On	2. Click the ‘Virtual Try-On’ button.	item's background and an ‘Upload Photo’ button is shown.			
Test Case 12: Verify Upload Photo in Virtual Try-On	1. Click the ‘Upload Photo’ button. 2. Choose a photo.	The photo is uploaded and the item can be moved around the photo.	Same	Pass	
Test Case 13: Verify Product Information Display	1. Navigate to a product card (e.g. Blouse)	The product card displays: 1. Product image (s) 2. Product name 3. Price 4. Seller Details 5. Description and details of product (e.g. color, size) 6. Interaction buttons: Buy Now, Report Item, Add to Wishlist and virtual try-on	Same	Pass	
Test Case 14: Verify “Buy Now” button Functionality	1. Click the ‘Buy Now’ button	The app navigates to the chat screen where the buyer can chat with the seller.	Same	Pass	
Test Case 15: Verify Report Item Functionality	1. Click on the ‘Report Item’ button. 2. Fill in the Report Item form (issue, description and optional attachments)	The system sends the report to the admin team and a confirmation message is displayed: “Your	Same	Pass	
	3. click the ‘Report’ button	report has been sent to our admins. We will update you on the issue. Thank you.”			
Test Case 16: Verify “Log Out” button Functionality	1. User taps in the ‘Log Out’ option from the profile page	The user is logged out successfully and redirected to the login page	Same	Pass	
Test Case 17: Verify Switch to Seller Mode Functionality	1. Click the ‘Seller Mode’ button on the profile page	The user is switched to seller mode and profile UI updates to reflect seller options and the backend database updates the user's role to ‘Seller’.	Same	Pass	
Test Case 18: Verify Add Product as Seller	1. Seller click on the ‘Add Item’ icon 2. fill in the form with valid data 3. submit it	The product appears in the seller’s inventory and is visible to buyers in the product catalog.	Same	Pass	

3. UAT 3

1318D: USER ACCEPTANCE TEST					
Test designed by: Hadura Fairuzza (2113584), Nur Fatihah (2115778)					
Test executed by: Afiq bin Ahmad Rizal					
Test execution date: 5 January 2025					
Test Case	Test Step	Expected Result	Actual Result	Pass/Fail	Remarks
Test Case 1: Registration with Valid Input	1. Click on “Do not have an account? Register” 2. Fill in the form using a valid IIUM live email and password. 3. Click the ‘Register’ button	Registration is successful, and a verification email is sent to the user.	As expected	Pass	
Test Case 2: Registration with Duplicate Email	1. Click on “Do not have an account? Register” 2. Fill in the form using a registered IIUM live email and password. 3. Click the ‘Register’ button	Registration fails, and an error message appears: “Email already registered”.	As expected	Pass	
Test Case 3: Registration with non-IIUM Live Email	1. Click on “Do not have an account? Register” 2. Fill in the form using non-IIUM live email and password. 3. Click the ‘Register’ button	Registration fails, and an error message appears: “Please use a valid IIUM live email”.	As expected	Pass	
Test Case 4: Login with Valid Credentials	1. Fill in the form using a registered live email 2. Put the correct password 3. Click the ‘Login’ button	System successfully logs in the user and redirects to the home page.	As expected	Pass	
Test Case 5: Login with Invalid Password	1. Fill in the form using a registered live email 2. Put the incorrect password 3. Click the ‘Login’ button	Login fails and an error message appears: “Incorrect Password.”	As expected	Pass	
Test Case 6: Login with Unregistered Username	1. Fill in the form using a non-registered live email 2. Click the ‘Login’ button	Login fails and an error message appears: “Username not registered.”	As expected	Pass	
Test Case 7: Verify Homepage Search Functionality	User enters a keyword (e.g. “kemeja”) into the search bar and presses search.	Relevant items (e.g. “kemeja”) appear in the search results.	As expected	Pass	
Test Case 8: Verify Sending a Message	1. User opens a chat, types “Hi, is this item still available?” 2. click Send.	Message is sent successfully and appears in the chat window.	As expected	Pass	
Test Case 9: Verify Adding an Item to Favorite	1. User clicks on the “Add to Wishlist” button for a preloved item in the homepage.	The item is added to the wishlist and appears on the wishlist page	As expected	Pass	
Test Case 10: Verify Removing an Item from Favorites	1. User navigates to the wishlist page 2. User clicks the “Remove”	The item is removed from the wishlist and no longer appears on the wishlist page.	As expected	Pass	
Test Case 11: Verify Item	1. Click on an item in the Homepage.	The API background remover removes the	As expected	Pass	

Background Removed for Virtual Try-On	2. Click the ‘Virtual Try-On’ button.	item's background and an ‘Upload Photo’ button is shown.			
Test Case 12: Verify Upload Photo in Virtual Try-On	1. Click the ‘Upload Photo’ button. 2. Choose a photo.	The photo is uploaded and the item can be moved around the photo.	As expected	Pass	
Test Case 13: Verify Product Information Display	1. Navigate to a product card (e.g. Blouse)	The product card displays: 1. Product image (s) 2. Product name 3. Price 4. Seller Details 5. Description and details of product (e.g. color, size) 6. Interaction buttons: Buy Now, Report Item, Add to Wishlist and virtual try-on	As expected	Pass	
Test Case 14: Verify “Buy Now” button Functionality	1. Click the ‘Buy Now’ button	The app navigates to the chat screen where the buyer can chat with the seller.	As expected	Pass	
Test Case 15: Verify Report Item Functionality	1. Click on the ‘Report Item’ button. 2. Fill in the Report Item form (issue, description and optional attachments)	The system sends the report to the admin team and a confirmation message is displayed: “Your	As expected	Pass	
	3. click the ‘Report’ button	report has been sent to our admins. We will update you on the issue. Thank you.”			
Test Case 16: Verify “Log Out” button Functionality	1. User taps in the ‘Log Out’ option from the profile page	The user is logged out successfully and redirected to the login page	As expected	Pass	
Test Case 17: Verify Switch to Seller Mode Functionality	1. Click the ‘Seller Mode’ button on the profile page	The user is switched to seller mode and profile UI updates to reflect seller options and the backend database updates the user's role to ‘Seller’.	As expected	Pass	
Test Case 18: Verify Add Product as Seller	1. Seller click on the ‘Add Item’ icon 2. fill in the form with valid data 3. submit it	The product appears in the seller’s inventory and is visible to buyers in the product catalog.	As expected	Pass	