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Self-Service Laundry Booking Application for Tun Dr Ismail Residential College

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Keywords

Laundry booking application, Tun Dr Ismail residential college, object-oriented

Abstract

The laundry booking application proposed in this project is intended to address the inconveniences associated with the laundry process in Tun Dr Ismail Residential College. The current laundry booking system, which operates on a "first come, first serve" model, often results in unpredictable wait times, user dissatisfaction, and expenditure of resources. A laundry booking application designed using object-oriented approach that modernizes the process, improves user convenience, and guarantees equitable access to laundry facilities are designed. This application has some great features like an that let students book laundry slots, checking machine availability in real-time, and notifications to let you know when student has booked a slot and when they've finished their cycle. Administrators have tools for monitoring laundry room usage and manage machine availability. As a result, the project offers a promising result that enhances functional effectiveness but also contributes to the overall satisfaction and well-being of the council community.

1. Introduction

The case involves creating a self-service laundry booking application for Tun Dr Ismail residential college in UTHM, where students currently rely on a first-come, first-serve approach. Students face challenges such as checking machine availability, waiting during peak hours, and the risk of their laundry being removed or misplaced. The proposed application aims to address these issues by providing a more efficient and convenient way for students to book laundry slots, reducing wait times, and enhancing the security of their laundry.

The current "first-come, first-serve" laundry process in the residential college is inefficient and inconvenient. Students lack the ability to secure specific time slots, leading to extended wait times during peak hours. The system requires physical presence in the laundry room to claim a machine, resulting in time-consuming queues. This waiting time conflicts with students' schedules and responsibilities. Additionally, there's no notification system for completed laundry cycles, forcing students to stay near the machines or make multiple trips. The lack of monitoring capability can lead to delays and disruptions for both current users and those waiting to use the laundry facilities.

The primary objectives of this project revolve around the creation of a self-laundry booking application employing Object Oriented Programming (OOP) principles. The intent is to design a sophisticated yet user-friendly web-based platform that seamlessly facilitates the booking of laundry services. Through the application of OOP, the application aims to ensure a well-structured and modular design, enhancing maintainability and scalability. Additionally, a pivotal goal is the development of a responsive and intuitive web interface to optimize user experience during the booking process. The culmination of these efforts will be subjected to rigorous user

acceptance testing, a crucial step to guarantee the application's accuracy, reliability, and overall usability. By adhering to these objectives, the project aspires to deliver a robust self-laundry booking system that meets both functional and user-centric requirements.

The paper is organized into 5 sections. Section 1 introduces the project background and explains the problem statement, objectives, scope, expected result and significance of this project. Section 2 discusses the comparison of each related work. Section 3 describes the methodology that has been used. Section 4 explains about analysis and design that got from this study and the discussion. Lastly, section 5 discusses the conclusion.

2. Related Work

2.1 Mobile Application

A mobile application, commonly referred to as an app, is a type of application software designed to run on a mobile device, such as a smartphone or table computer. These applications frequently serve to provide users with similar services to those accessed on personal computers. Apps are generally small, individual units with limited functions. According to [1] mobile apps have been defined as the ultimate marketing tool and a go-to promotional strategy for drawing in business from clients that are “on the go” [2]. They have a lot of potential for interacting with customers because of aspects like uniqueness, vibrancy, and integrated functionality [3], facilitating interactions between one person and several [4]. Apps have become more and more popular over the past ten years (Buildfire, 2021 reports that there are over 2.87 million available). Despite a slowdown in growth, apps are still a vital component of digital marketing strategies and have a significant impact on economies around the globe. The advent of Internet booking systems has revolutionized the way businesses operate and clients make reservations. With all day long availability, customers can conveniently book reservations online, reducing operational costs and freeing up time for value-added tasks. Empowering users with control over their bookings, the system allows easy management and flexibility for changes or cancellations. Offering real-time availability, automated reminders, and notifications, it enhances customer convenience, reduces waiting times, and improves communication. The online booking system streamlines processes, making reservations accessible anytime, anywhere, and contributing to increased attendance rates.

There are numerous advantages for both businesses and customers, which include continual availability. The customer can make reservations at any time of the day or even during business hours through the apps. It also helps in reducing the operations costs. Mobile Apps can greatly reduce the cost of office administration and free up workers’ time to perform additional value-added activities, thanks to automated scheduling and reservation tasks. Besides, it builds user empowerment by giving users greater control to decide on their booking. To give them a sense of empowerment and flexibility, they can easily manage, change, or cancel reservations according to their preferences. It also offers convenience and flexibility to customers. Customers can make reservations at their convenience, without being restricted by business hours. This app also provides real time availability to the customers. To ensure that customers are sure they have the right time in their schedule, an online reservation system will provide them with a clear insight into whether appointments and reservations are available. Besides that, there are also automated reminders and notification. Users can keep informed of their reservations through automatic reminders and notifications. This feature will contribute to reducing absences, increasing attendance rates and improving communication throughout the organization. By using mobile application, it decreased waiting times. Customers can check availability and make reservations online without having to wait in line or on hold, which can cut down on waiting times.

Despite knowing advantages of mobile application, there are also disadvantages when these apps are adapted into business or when using the apps software. One of the disadvantages are technical difficulties. Access can be hampered by technical obstacles like slow internet connectivity or problems with device compatibility. Users who lack knowledge about how online booking tools work also become a problem [5]. Besides, security issues have become a concern in online booking. According to [6], new kinds of security risks are emerging because of the digitalization of online reservation systems. Cyberattack attempts against platforms that employ metasearch engines can take many different forms, including attempts to decrypt sensitive data, seize control of internal systems, take over user accounts, access users’ e-banking platforms and phishing.

The features of mobile applications include various aspects such as user trust, service quality, user generated content and system design, all of which have a role in influencing booking intents and creating the entire user experience. According to [7], the most important feature for a good online booking app is a calendar. The local time, which varies from server time depending on the user’s time zone, is shown on the calendar page. Remote users can view available or reserved time slots in accordance with their local time zones thanks to this automated time conversion [8]. Another key features that can help to build a good booking app are real-time booking and confirmation problem [5]. Customers should be able to book and confirm their reservations in real time. This guarantees that consumers receive prompt confirmation of their bookings and helps to lower the risk of overbooking.

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2.2 Comparison of Existing System

This part discusses the existing systems that are similar to the application that are going to be developed. By studying the existing system, comparisons can be made with other systems, subsequently able to identify the advantages and disadvantages of the system. This can help in developing a new system. Table 1 summarise the comparison between the develop system and are similar system will be shown after the description of the three-existing system.

Table 1 *Comparison of Existing System*

Application/ System	LaundryView Monitoring System	Laundry ReSTART	Speed Queen Laundry	Self-service Laundry Booking Application for KKTDI
Login	X	√	√	√
Registration for New Account	X	√	√	√
Real-time Availability	√	√	X	√
Reservation	X	√	X	√
Reservation Cancellation	X	X	X	√
Notification	X	X	√	√
Feedback	X	X	X	√
Usability platform	Web-based	Mobile Application	Mobile Application	Mobile Application

3. Methodology/Framework

Prototyping model is the software model process used in developing the proposed application. According to [7], prototyping is an approach based on evolutionary view of software development and having impact on the development process. Prototyping involves producing early working versions of the future application system and experimenting with them.

Prototyping model is chosen because this model enables validating a solution proposal before developing the full product through cost effective testing with real users [9]. Prototyping model consists of a few phases in the Software Development Life Cycle (SDLC) to develop the proposed application. The phases included in prototyping model are planning, requirement analysis, design, implementation, and testing. Moreover, the prototyping model is iterative that enable the developed prototypes to be improved to fulfil the requirements of the stakeholders.

Table 2 *System Development Activities*

Phase	Task	Output
Planning	Work scheduling, problem identification, scope, and objective.	• Proposal • Gantt chart

Table 2 (cont) *System Development Activities*

Analysis	Collect and analyze information.	• System requirements • Software and hardware requirements • Unified Modelling Language (UML) • Sequence diagram • Activity diagram • Class diagram
Design	Design user architecture with the suitable programming language.	• Database design • User interface design
Implementation	Carry out the testing system and fix the errors.	• System prototype.
Testing	Testing and tracking if there are an error on the system by the user	• The system has been fully tested and is ready for use.

Table 3 and Table 4 show the functional and non-functional requirements of self-service laundry online booking application, respectively.

Table 3 *Functional requirements of the proposed application*

Module	**Functionality**
Registration Module	The application should allow administrators and students to register accounts with the system by providing necessary information like username, email, phone number and password.
Login Module	The application should allow users to login to application using email and password. The application should redirect users to their respective main page once successful login.
Laundry Service Selection	The application should allow users to choose the type of laundry service they require, such as washing or drying.
Real-time Availability Display	The application should display real-time information about the availability of washing and drying machines, allowing users to see when machines are in use or available.
Notifications	Users should receive automated confirmations upon successful reservation and reminders leading up to their scheduled laundry time or finished laundry session.
Administrator Dashboard	Administrators should have access to dashboard with an overview if laundry usage, reservation statistics and other relevant information.

Table 4 *Non-functional requirements of the proposed application*

Requirement	**Description**
Performances	The application should have a response time of not more than 10 seconds for common user interactions
Availability	The application should be available 24/7, with scheduled maintenance communicated to users in advance.
Security	The application should implement secure authentication mechanisms to prevent unauthorized access.
Usability	The application should have a user-friendly interface with clear navigation and intuitive design.
Compatibility	The application should be compatible with a range of web browsers like Chrome and devices like desktops and smartphones.

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4. Analysis and Design

This section explains the analysis and design of the KKTDI Self-Service Laundry Booking Application that have been proposed in this project.

4.1 Use Case Diagram

The use case diagram in Figure 1 shows there are seven modules such as register, login, check machine availability, make reservation, cancel reservation for first actor, student. Besides, monitor laundry room usage and manage laundry machine availability for the second actor, administrator.

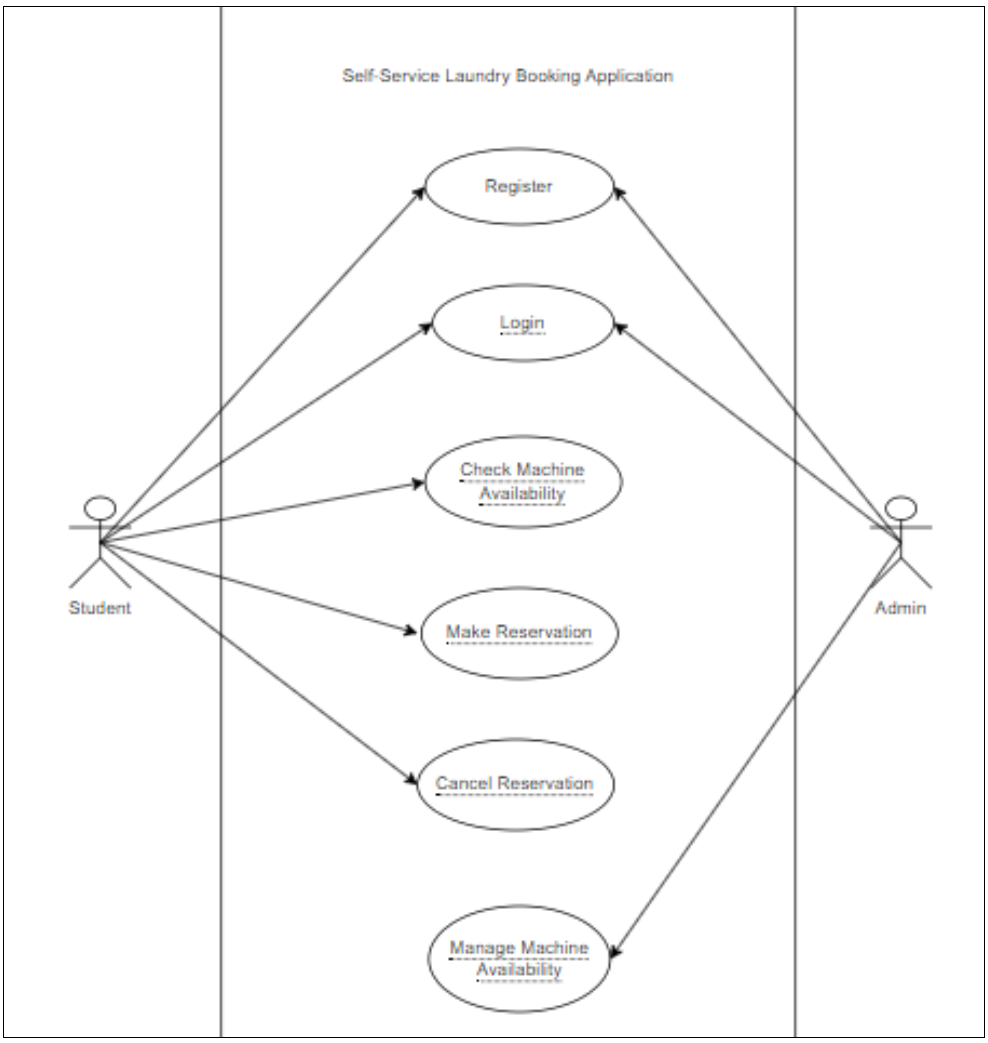

Fig 1. *Use Case Diagram of KKTDI Self-Service Laundry Booking Application*

4.2 Interface Design

Figure 2 shows the interface design for Register Page. The user is required to fill in three text fields to create a new account. Button 'Register' is included. The 'Register' button is clicked when user done filling all the information needed.

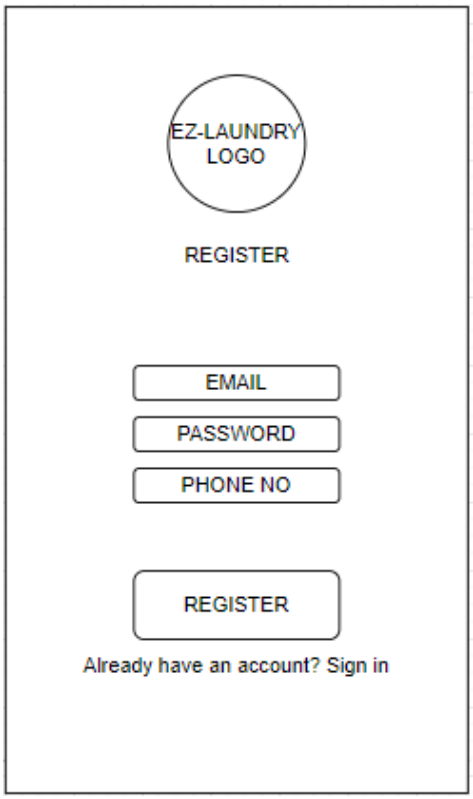

Fig 2. *Register Page Design*

Figure 3 shows the interface design of the Login Page. Users are required to fill in email and password followed by clicking 'Login' button to login to the application. Links are provided in this page which is 'Sign Up. When the user clicks 'Sign Up', the application will move to the Register Page.

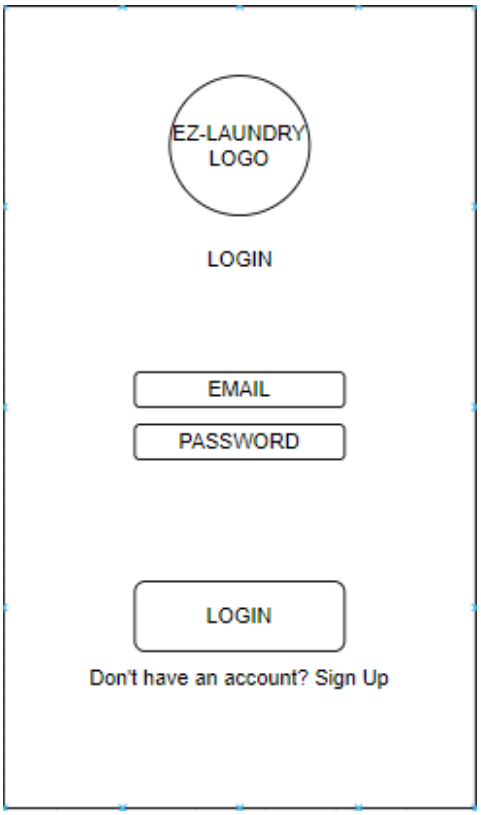

Fig 3. *Login Page Design*

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Figure 4 shows the interface design of Student Home Screen. After the student logs in to the application, the application will redirect them to this page. In this page, two options are displayed that allow students to choose to view the availability of washing machine or drying machine.

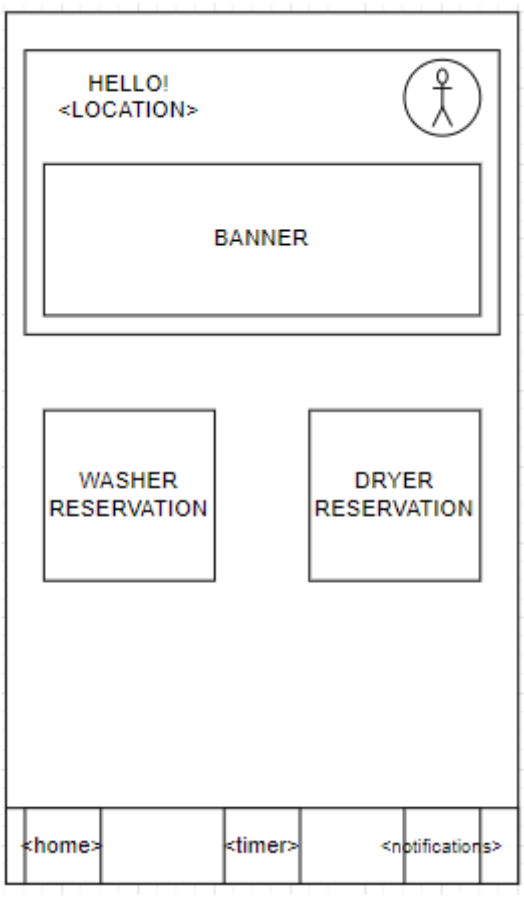

Fig 4. *Student Main Page Design*

Figure 5 shows the interface design of Administrator Main Page. After the administrator logs in to the system, the system will redirect them to this page. In this page, two options are displayed that allow administrator to choose to view the laundry room usage or manage machine availability

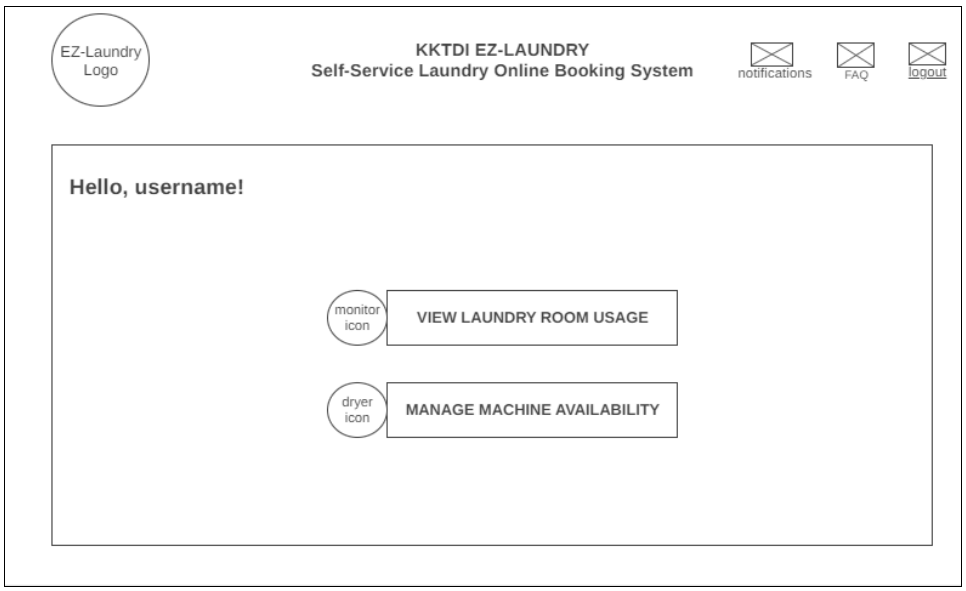

Fig 5. *Administrator Main Page Design*

Figure 6 shows the interface design of View Washer Availability for the student while Figure 7 shows the interface design of View Dryer Availability. This page will display the laundry machines with their number and status whether it is available or in use.

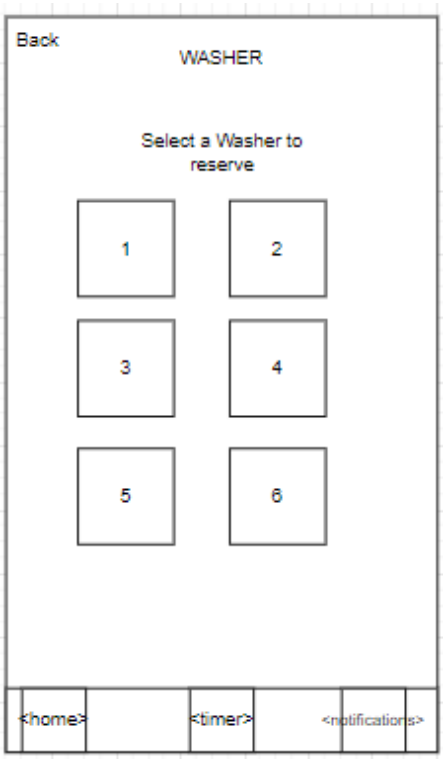

Fig 6. *View Washer Availability for Student*

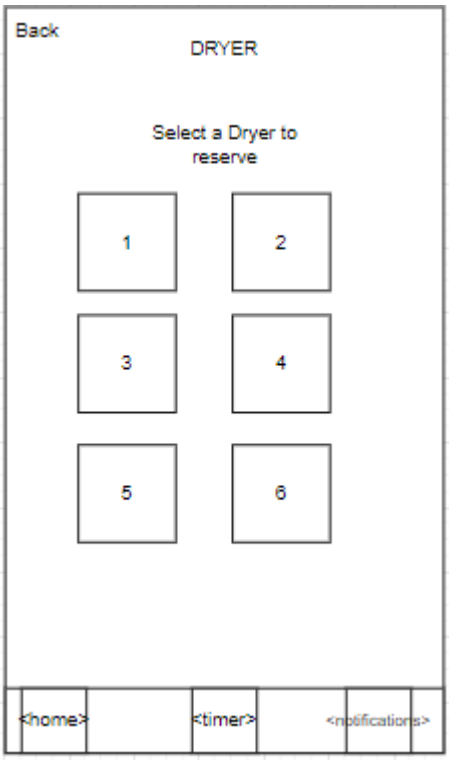

Fig 7. *View Dryer Availability for Student*

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Figure 8 shows the interface design of Make Reservation Page. Students can make reservations upon the available machine by clicking 'Select' button. A popup will show up to confirm the reservation. The reservation is made when students click 'Proceed' button and no reservation will be made if they click 'Cancel'.

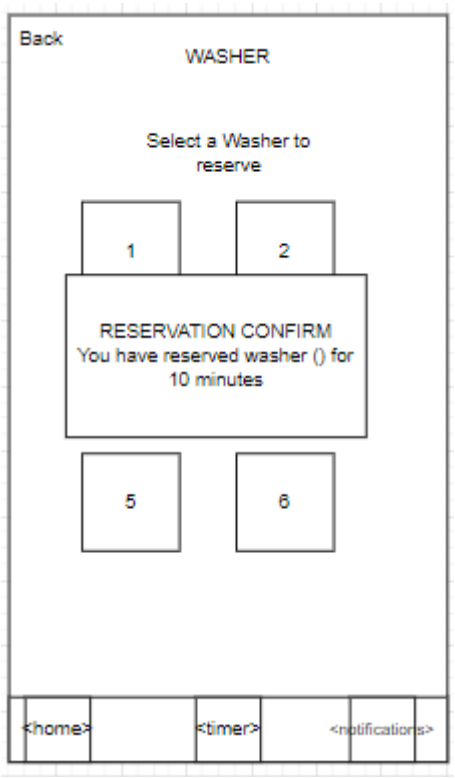

Fig 8. Make Reservation Page Design

Figure 9 shows interface design for Manage Machine Availability Page. The system will display the laundry machines with their number and status. The administrator can manage the availability of the machine by clicking on the 'Manage' button.

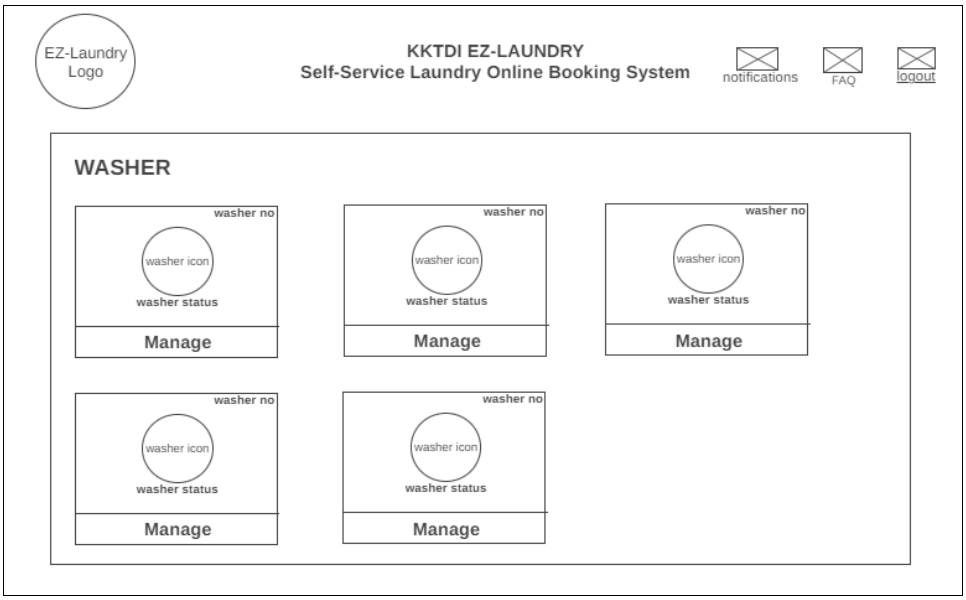

Fig 8. Manage Machine Availability Page Design for Administrator

5. Result and Discussion

5.1 Interface Design

In this part, a few examples of modules will be shown. The Self-Service Laundry Booking System is named 'EZ-Laundry Booking App', developed using programming language JavaScript and HTML, while the database used is Firebase. The coding for this project is created during the implementation phase. Figure 11 shows example of implemented interfaces.

Fig 9. *Example of implemented interface*.

5.2 Functional Testing Result

Before the system is released, testing is important to make sure that all the functionalities of the system can be carried out. In this part, testing will be implemented on the function of each module developed EZ-Laundry Booking App. Table 5 shows the testing result for each module functionality.

Table 5 *Testing Result of System Modules*

Modules	No.	Test Case	Expected Result	Actual Result
Login and Registration	1	Submit the register/login form without any input.	Register/Login fails	PASS
	2	Submit the register form without name.	Register fails	PASS
	3	Submit the register/login form without email address.	Register/Login fails	PASS
	4	Submit the register/login form without password.	Register/Login fails	PASS
	5	Submit the register form with password and confirm password that are not same.	Register fails	PASS

Table 5 (cont): *Testing Result of System Modules*

	6	Submit the register/login form with complete and correct input.	Register/Login successful	PASS
	7	Submit the login form with incorrect email.	Login fails	PASS
	8	Submit the login form with incorrect password.	Login fails	PASS
Washer Reservation	1	Users can click 'Washer Reservation'	Display list of washers	PASS
	2	Users can choose available washer from the list of options	Only available washer can be selected	PASS
	3	Users can click 'Reserve' to reserve the washer	An alert message appears.	PASS
	4	Users can click 'OK' at the alert message	Reservation timer start.	PASS
Dryer Reservation	1	Users can click 'Dryer Reservation'	Display list of dryers	PASS
	2	Users can choose available dryer from the list of options	Only available dryer can be selected	PASS
	3	Users can click 'Reserve' to reserve the dryer	An alert message appears.	PASS
	4	Users can click 'OK' at the alert message	Reservation timer start.	PASS
Washer Timer	1	Users can click 'OK' after reservation confirmation	Timer is running	PASS
	2	Users can click 'Start Washing'	Timer is running	PASS
Dryer Timer	1	Users can click 'OK' after reservation confirmation	Timer is running	PASS
	2	Users can click 'Start Washing'	Timer is running	PASS
Checking Washer/Dryer Availability	1	Users can check the list of laundry machine to see their status (available, in use, reserved) when logged in and authenticated.	Display laundry machine with their current status	PASS
Updating Laundry Machine Status	1	Users can click 'Login'	Display admin page	PASS
	2	Users can click 'Maintenance'	Display list of washing machine and drying machine	PASS
	3	Users can click dropdown button.	Display status 'Available','Unavailable', and 'In-Maintenance'.	PASS
	4	Users can click 'Save Changes'	Display current status of the laundry machines	PASS

5.3 Functional Testing Result

After the functional testing is conducted, the system is next implemented with the user acceptance testing. The testing is conducted by sharing the website link to a group user and their review is collected using Google Form. There are 10 respondents selected to participate in the user acceptance testing. They will review the system based on functional and non-functional requirements. The result is converted to a chart shown figures below.

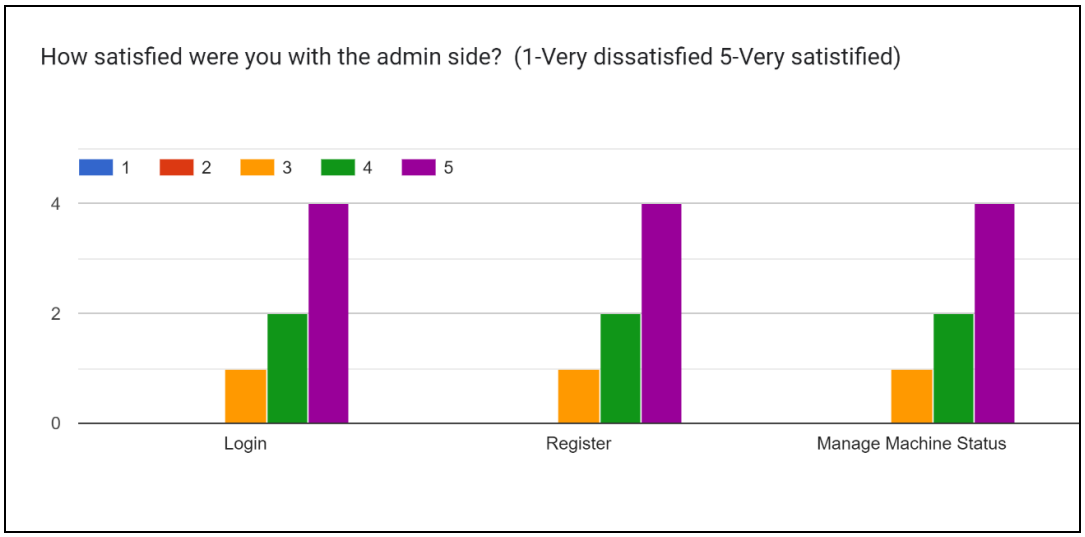

Fig 10. *Results of Functional Requirement for Admin Side*

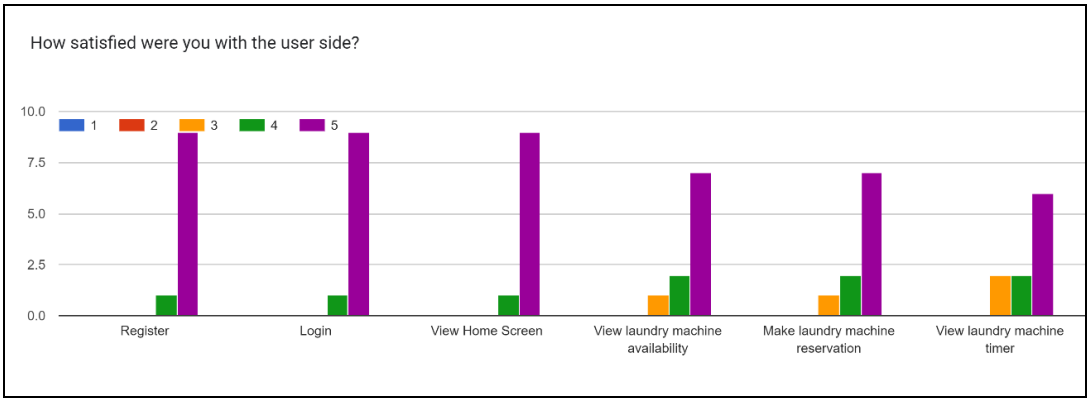

Fig 11. *Results of Functional Requirement for User Side*

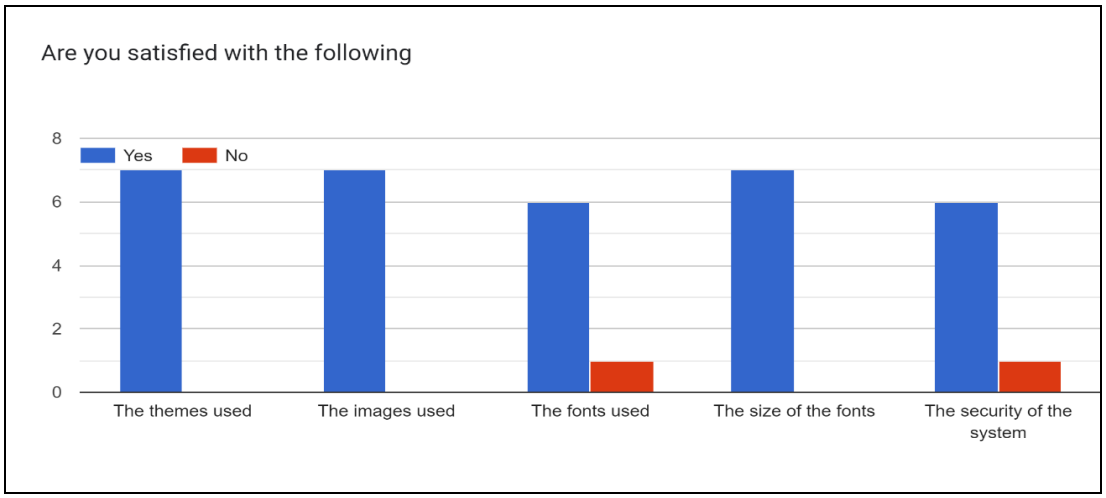

Fig 12. *Results of Non-Functional Requirement for Admin Side*

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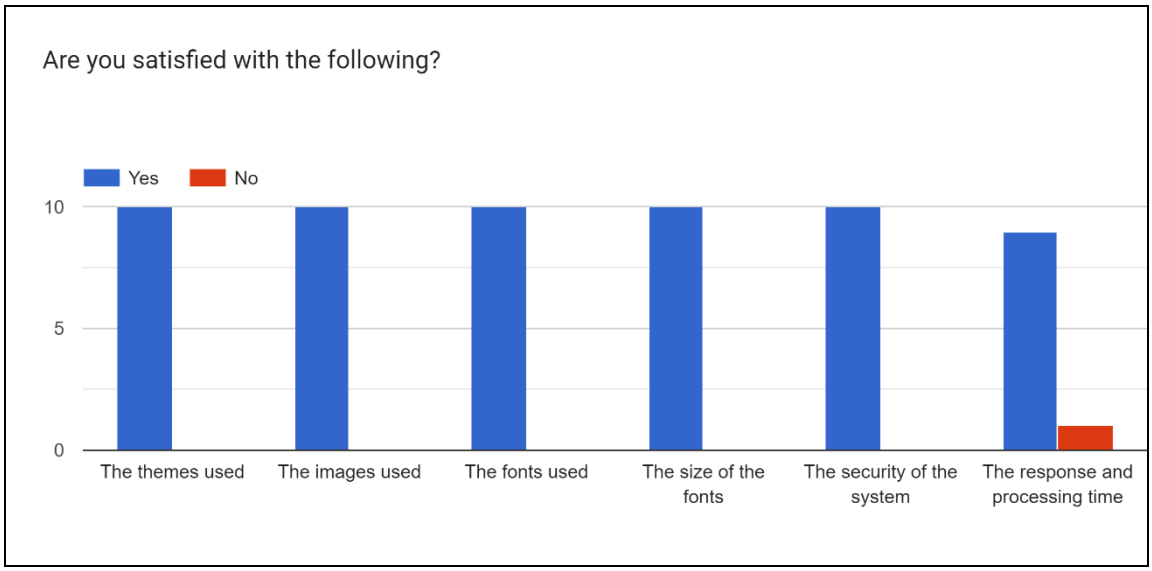

Fig 13. *Results of Non-Functional Requirement for User Side*

5.4 Discussion

In conclusion, the implementation of the system is successful since the functionalities can be worked properly. However, there is room for improvement of the system since some ratings are below "satisfied" rating. For example, the viewing machine availability module should be more efficient to return more accurate results to users. The performance of the system should be improved by making sure the loading time does not take too long to response.

6. Conclusion

The introduction of a user-friendly interface, real-time machine availability tracking, and flexible reservation management empowers students to take control of their laundry schedules, reducing wait times and optimizing resource utilization. The system's adaptability to changing needs, scalability for future expansions, and integration with existing campus systems contribute to its long-term viability and relevance.

In conclusion, the booking application represents a transformative step forward in the optimization of laundry facilities for residential college communities. By embracing technological advancements and user-centric design principles, the project not only resolves existing challenges but also sets a foundation for a more efficient, adaptable, and harmonious living environment. The success of this endeavor reflects the commitment to enhancing the overall quality of life for the campus community and stands as a testament to the collaborative spirit driving innovation within the residential college setting.

Acknowledgement

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References

[1] Watson, J., McCarthy, M., & Rowley, J. (2013). Consumer attitudes towards mobile marketing in the smart phone era. International Journal of Information Management, 33(5), 741-748. https://doi.org/10.1016/j.ijinfomgt.2013.06.005

[2] Sridhar, S., & Fang, E. (2019). New vistas for marketing strategy: Digital, data-rich, and developing market (D3) environments. Journal of Business Research, 102, 1-10. https://doi.org/10.1007/s11747-019-00698-y

[3] Kim, E., Lin, J. S., & Sung, Y. (2013). To app or not to app: Engaging consumers via branded mobile apps. Journal of Interactive Advertising, 13(1), 53-65. https://doi.org/10.1080/15252019.2013.782780

[4] Watson, W. R., et al. (2019). Facilitating interactions between one person and several: A conversation analysis approach. In J. M. A. M. van der Meer, & J. M. A. M. van der Meer (Eds.), The Routledge Handbook of Language and Communication (pp. 123-136). Routledge.

[5] Kamsin, A., & Chang, S. K. (2005). *The Study on Online Booking Among Young Malaysian.* https://repo.uum.edu.my/id/eprint/14341/1/ICoEC-1a3.pdf

[6] Augustyn, D., & Tick, A. (2020, November 5). Security Threats in Online Metasearch Booking Services. https://doi.org/10.1109/cinti51262.2020.9305839

[7] Muñiz. (2017, November 12). 12 Most Important Features Your Online Booking System Should Have. Bookinglayer. https://www.bookinglayer.com/article/the-12-most-important-features-your-online-booking-system-should-have4.

[8] Auer, M. E., El-Seoud, S. A., & Karam, O. H. (2022, October 14). Artificial Intelligence and Online Engineering. Springer Nature.5.

[9] Bjarnason, E., Lang, F., & Mjöberg, A. (2023, August 30). An empirically based model of software prototyping: a mapping study and a multi-case study. *Empirical Software Engineering*, *28*(5). https://doi.org/10.1007/s10664-023-10331-w

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APPENDIX A

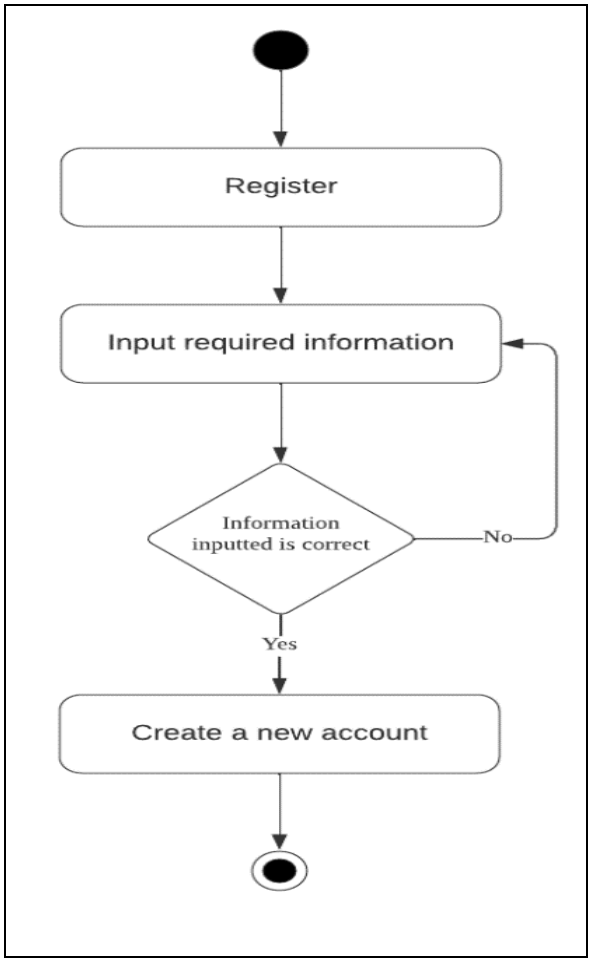

Fig 1. *Activity Diagram for Register*

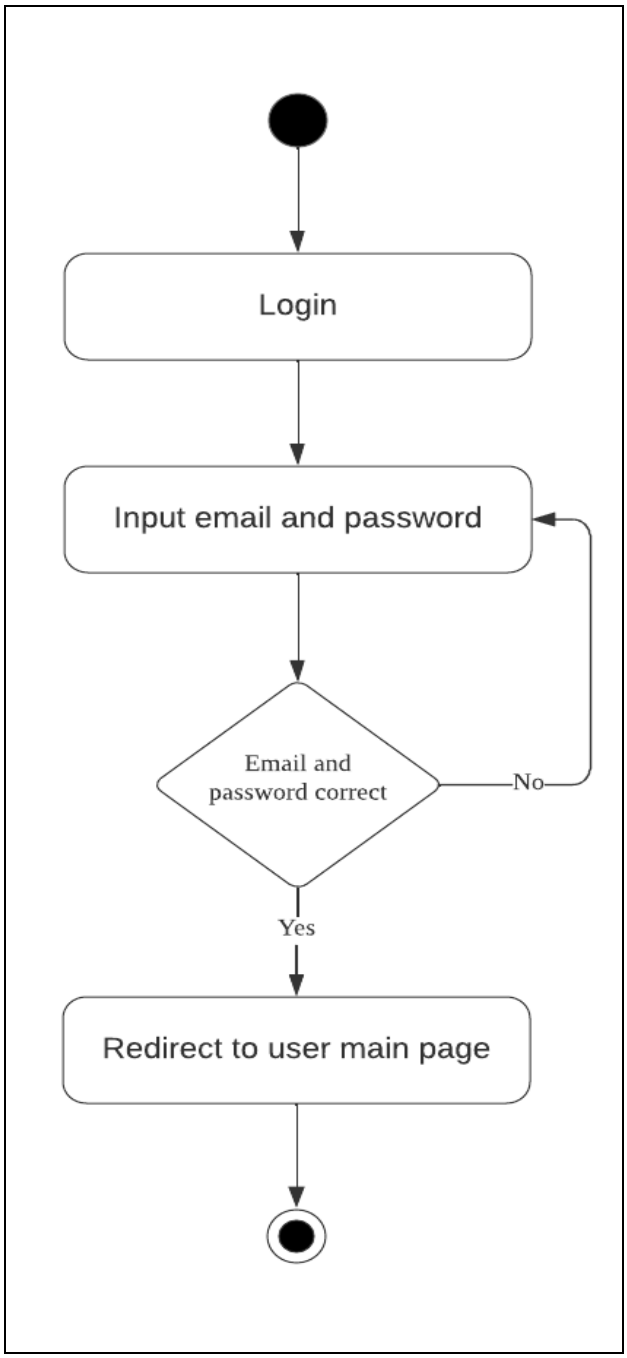

Fig 2. *Activity Diagram for Login*

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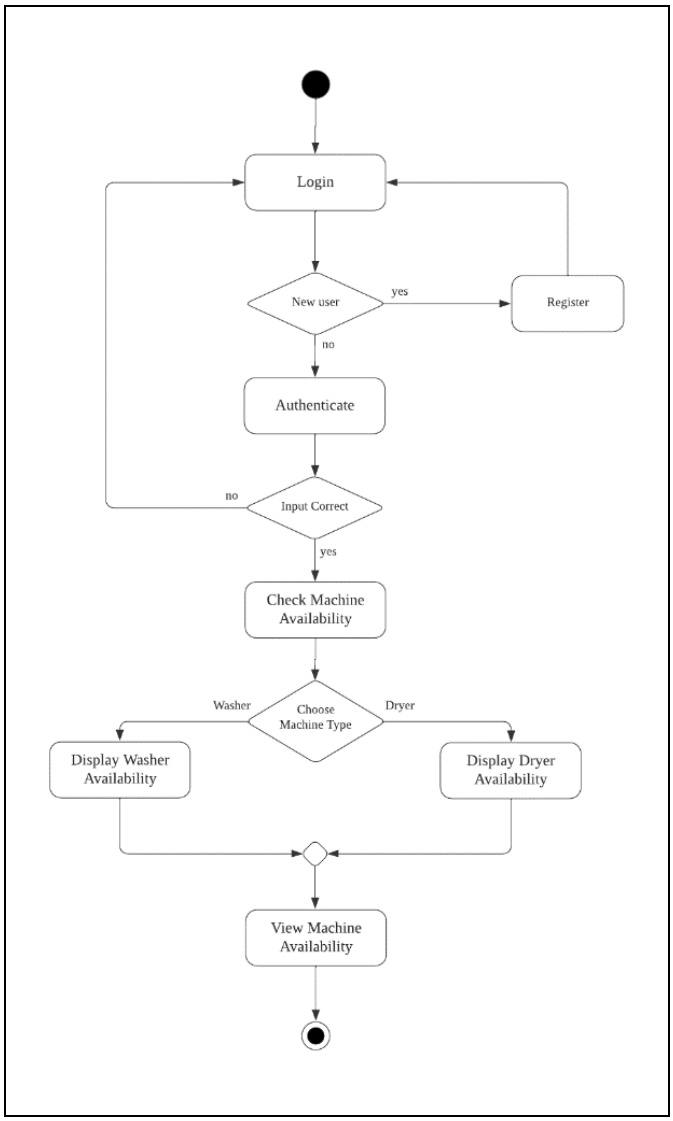

Fig 3. *Activity Diagram for Check Machine Availability*

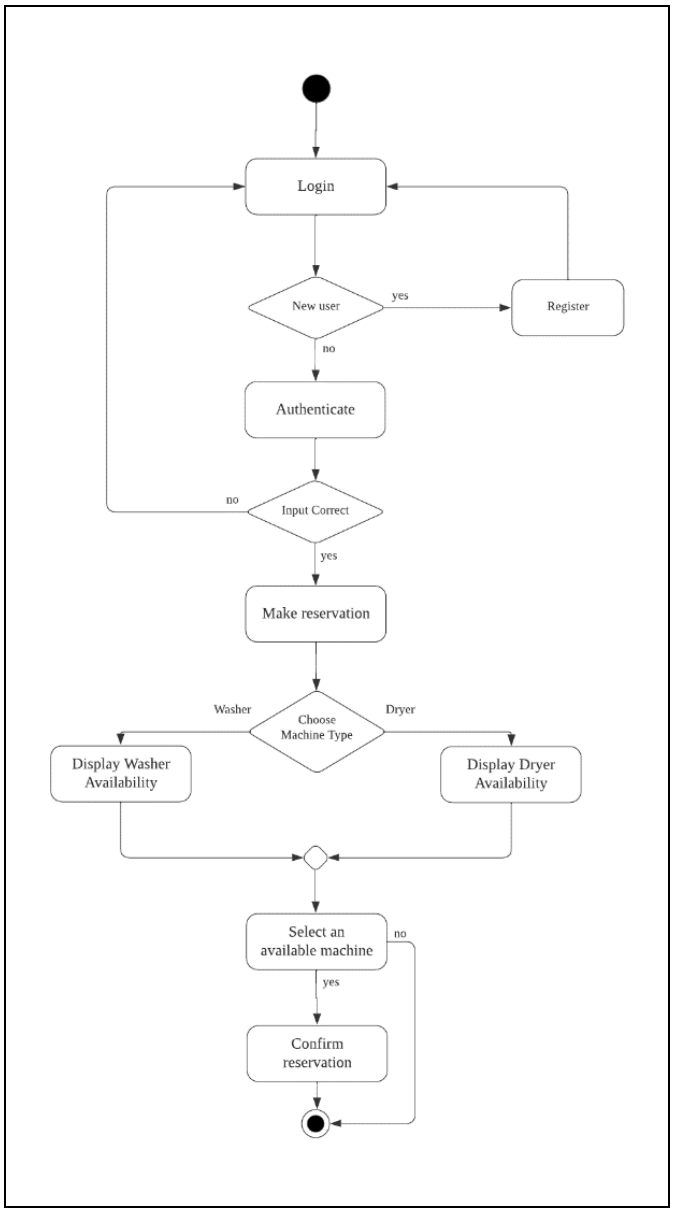

Fig 4. *Activity Diagram for Make Reservation*

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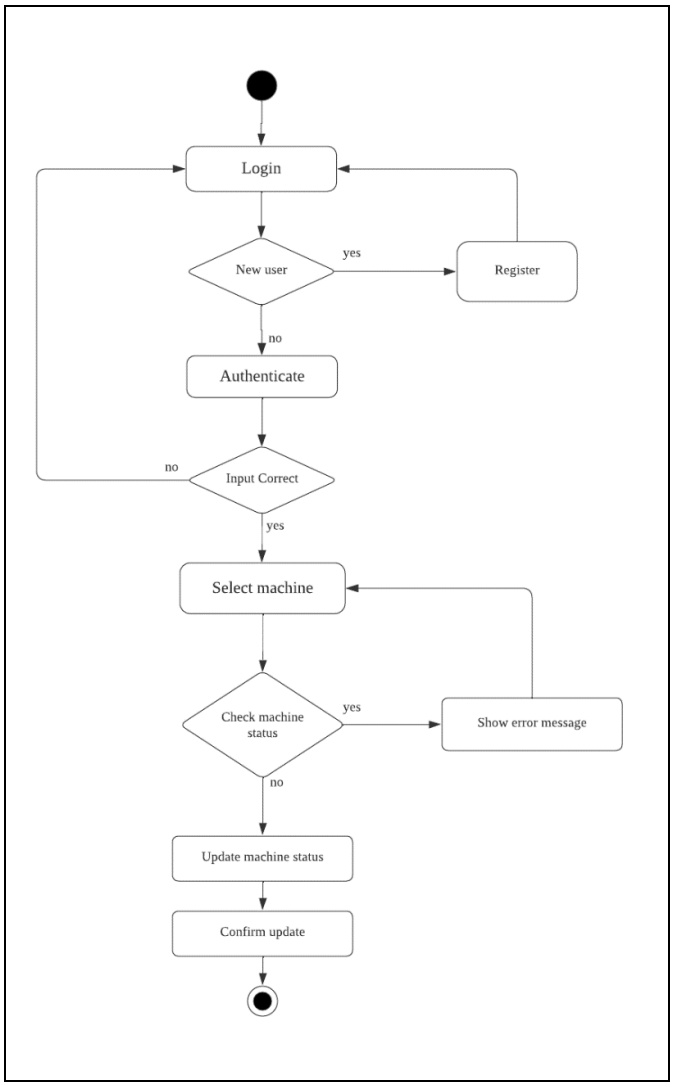

Fig 5. *Activity Diagram for Monitor Laundry Room Usage*