MJoSHT
Malaysian Journal of Science, Health & Technology
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The Planning Process of the "WISE ASSIST" Daily Living System for Senior Citizens

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Article Info
Article history:
Received: 7 November 2023
Accepted: 24 January 2024
Published:5 April 2024

Academic Editor:
Mohd Hafiz Abu Hassan

Malaysian Journal of Science, Health & Technology

MJoSHT2024, Volume 10, Issue No. 1
eISSN: 2601-0003

https://doi.org/10.33102/mjosht.v10i1.389

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***Abstract*— This paper presents the planning process for a mobile application for senior citizens called Wise Assist. According to the World Health Organization, Malaysia will become an aged country, and it has been reported that one in six people will be over 60 years of age by 2030. Along with this prediction, there are several suggestions expressed by the Deputy Minister of Women's, Family, and Community Development to develop initiatives and innovative ideas that can contribute to the welfare and enrich the lives of the elderly in Malaysia. Therefore, this research aims to develop a mobile application that provides services to help caregivers ensure that senior citizens receive proper age care and allow them to perform their daily tasks easily. Although many applications are developed nowadays, the main issue is targeted at senior citizens. In this case, they are one of the groups that need attention because although modern information technology products are affecting the younger generation's lifestyle, they have a much smaller impact on senior citizens. In general, although this application will be used by caregivers, in a broader context, it will have a large impact on the lives of senior citizens. For example, caregivers can book a companion for senior citizens whenever they need one, such as going to an appointment for dialysis or other medical appointment purposes. This application mainly targets caregivers or family members who have difficulty or issues in accompanying senior citizens for medical checkups whenever they have other schedules that conflict with the date of the appointment by booking an assistant who will accompany senior citizens at home while they are not available. Therefore, it is highly recommended that caregivers use this application to ensure that senior citizens receive proper health care.**

***Keywords*— Senior citizens; Caregiver; Health; Mobile Application; Assistant**

I. INTRODUCTION

Humans desire that all of them have a good life and enjoy prosperity in the present and in the future. Thus, the existence of the Sustainable Development Goals (SDGs) proposed by the United Nations in 2015 has shifted the world toward a more sustainable path. By 2030, the agenda targets multiple areas for action, including poverty and sanitation, achieving gender equality, and building local economies while addressing people's social needs. It demands that the SDGs are achieved

for all ages and demographic groups of society, with a special emphasis on the most vulnerable, including older people [1]. Therefore, this research is consistent with the third goal of the SDGs, which is to ensure healthy lives and promote well-being for everyone, regardless of age, including senior citizens. Preparing for an aging population is a crucial element in the achievement of the integrated 2030 Agenda, with aging cutting across the goals of giving them the best treatment and good health to achieve truly transformative and sustainable development outcomes. Based on Family, Women, and Community Development (KPWKM), the ministry highlighted that enhancing the well-being of senior citizens is one of its responsibilities as Malaysia will become an aged country by 2030. In preparation for going through the changes in 2021, Dato Siti Zailah Mohd Yusoff, the Deputy Minister of Family, Women, and Community Development, said that to ensure that Malaysia can achieve one of the plans proposed by KPWKM, that aim to support the conductive environment toward senior citizens, a few initiatives should be taken to ensure that senior citizens can live a satisfying daily life.

Many changes occur in society nowadays because of the speedy evolution of technology, which improves daily. The extensive usage of technology by society shows that our world is shifting toward a situation in which we mainly depend on technology in everyday life. In general, the power of technology itself can solve many problems people face without referring to any age group. As people are already aware, many people use technology, especially the younger generation. However, for senior citizens, the benefits of technology have become a limitation. This is because they do not have any concerns regarding using technology as they age. Problems such as more struggles with memory and slowed thinking make them feel it is unnecessary to use it. The complexity of using this technology also makes senior citizens unable to catch up in learning how to use it compared to the younger generation, who uses technology daily and becomes used to it. Hence, if few mobile applications can provide benefits to senior citizen groups, it must be mobile applications that can take care of senior citizens' health and enhance their well-being.

According to the Population Reference Bureau 2023 data, Malaysia is included in the top 50 countries with the largest number of older adults, with a rank of 45 and a percentage of 32.75. This shows that the aging population demands more and that younger people are more involved as family caregivers. Moreover, because of issues such as low fertility and a distorted gender ratio in the population, most elderly people still receive their care from their families [2]. In this case, a caregiver can be either a family member or another person who takes care of senior citizens. In general, people who are committed to work are always busy with their work schedule as most of them have full-time jobs, and caregivers may not have enough time to take care of senior citizens because of their increased workload, which can be difficult if they take care of many people. In addition, caregivers may have another issue with transportation or may be unable to drive because of disability or other factors, which will make it difficult to bring senior citizens to events outside their homes. Caregiving encompasses different aspects of the caregiving relationship, including contentment, constructive interactions, and emotional assistance, and is predominantly based on personal perspectives [3]. Thus, caregiving is not a simple task. It involves the caregiver's time and energy to ensure that senior citizens are always in a good state. Conversely, the level of caregiving load differs depending on the chores completed. The perceived strain of caregiving is positively affected by interpersonal interactions between carers and patients [4].

This mobile application will help users assign an assistant to take care of senior citizens. In this case, the assistant can help in taking care of senior citizens whenever the caregiver has another schedule that conflicts with the health appointment or medical checkup. Users can book any assistant who is available at the time or day that they want. The following are the 10 services that users can choose when they need assistance for senior citizens: general health checkups, home care services, diabetes checkups and appointments, dialysis appointments, rehabilitation appointments, hearing screening, preventive screening, psychology, dental appointments, and optometrist appointments. These services are based on the list of the most common health checkups and welfare support needed by senior citizens provided by the Ministry of Health of Malaysia. Moreover, users can choose the assistant who meets their preferences based on the characteristics provided in the assistant's profile section. As a result, users can put their trust in the assistants they choose to take care of senior citizens. Thus, nowadays, senior citizens tend to depend on assistance in managing their daily routines [5].

There are three research questions for this study. (i) What are the gaps between this mobile application and other existing systems that offer companion services for senior citizens? (ii) How can the secure system be ensured to meet the preferences of both caregivers and senior citizens? (iii) How do we ensure that this system works well?

There are three research objectives of this study: (i) to investigate the gaps in the existing system that offers companion services for senior citizens, (ii) to investigate the needs of both caregivers and senior citizens using the secured Wise Assist daily living application for senior citizens, and (iii) to conduct user acceptance testing to ensure that the Wise Assist daily living application for senior citizens is working.

The existing mobile application that provides caregivers or assistant services for senior citizens does not have detailed information regarding the assistant who will manage the needs of senior citizens. To gain the trust of the users of the system, detailed information regarding the assistant's profile, such as the capability to perform the given task and the language that he or she uses to communicate, is needed in the system so that there will be no issues between the assistant and senior citizens, especially in the aspect of the language barrier. Thus, communication between both parties will be smooth, and misunderstandings and conflicts will be avoided.

Security is one of the crucial aspects when developing any system, whether it is a mobile application or a web-based system [6]. Security plays various roles in the system, including the protection of personal information. Before users start to book an assistant for a senior citizen, they must complete the senior citizen's information, such as the name, phone number, medication details, and address. This information must be kept confidential to protect their privacy and avoid unauthorized access. In addition, implementing security measures helps prevent other issues, such as identity theft and data breach, as the information stored in the application is secure and protected.

Choosing the right assistant who will manage and take care of senior citizens is one of the most crucial aspects to consider. Personal comfort and senior citizens' preferences must be prioritized. In this case, some senior citizens are more comfortable or relaxed with the assistance of a particular gender. They may feel more at ease when receiving care from a person of the same or other gender, depending on their own preferences or cultural standards that influence their comfort level. In addition, choosing the right assistant can maintain the dignity and privacy of senior citizens. Concerns regarding assistance with personal care duties such as taking a bath or dressing up can be eased by selecting an assistant of a particular gender. Gender stereotypes and preconceived notions can either bolster or undermine trust in caregiving. Conversely, when a male caregiver is involved, he may be perceived as having more authority and physical strength, which can negatively affect the quality of care. In addition, associating nurturing caregiving traits primarily with women implies a preconception that older individuals tend to place their trust in female caregivers for their care [7]. Therefore, respecting their choices can contribute to a positive caregiving experience for senior citizens.

People who are committed to their work and are living with their parents sometimes may not have enough time to take care of their elderly loved ones. In this case, because of their commitment to work, they might not be able to monitor their parents' medication schedules and might sometimes miss accompanying them to appointments or health checkups [8]. In addition, some people have full-time jobs and may not be available at home during the daytime, leaving senior citizens alone at home or at least accompanied by someone who cannot manage them. Besides, some people work full-time jobs and leave senior citizens alone or with someone unable to assist. For instance, a working couple's children, without a car license, may arrange transportation for their senior parents but face challenges managing hospital appointments. This highlights how work responsibilities can hinder the ability to dedicate time to elderly parents [9].

Because the population of people is increasing, especially in the senior citizen group, there is a need to have a system that can provide caregiving and assistance support to improve the quality of life of senior citizens. In general, some people or families that have more income can afford to hire a caregiver for a long period, so they do not need the system to help senior citizens. However, some people live with their parents, who are senior citizens, have other responsibilities such as work commitments, and do not have much time to take care of senior citizens, which becomes a huge factor in the system's development. The system is used by people who need to hire a caregiver when they cannot bring senior citizens to health appointments or medical checkups because of other commitments. This system is very helpful for them because it streamlines the process by eliminating the need for manual coordination and makes it simpler for caregivers to obtain the assistance that they require.

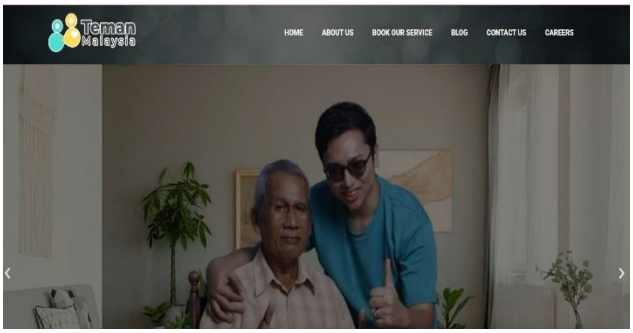


Fig. 1 Interface of the official website of Teman Malaysia

Teman Malaysia (Fig. 1) is a web-based system that provides booking services for people seeking a caregiver for senior citizens. The word "Teman" is from a Malay word that means companion. Like the meaning of the website, this system offers a companion for senior citizens to go to health appointments or medical checkups. It also provides a service to book a companion for stay-at-home senior citizens when the caregiver is not available at home. The following are the services offered by Teman Malaysia:

i) Teman to Health Appointment: This service allows users to book a caregiver for senior citizens' health checkups and visits to their doctors. They can book a caregiver when they have medical appointments and when they need to go to the pharmacy or do physiotherapy or any other related activities.

ii) Teman to Dialysis Treatment: This service allows users to book a caregiver to accompany senior citizens to the dialysis centers to receive treatments. The procedures included in this service are picking up senior citizens from their homes, dropping them off and assisting them to the dialysis center, bringing them back to their homes after the treatment is complete, and waiting when there is a request from the user.

iii) Curated Customized Activities: This service allows users to book a caregiver to accompany senior citizens to go anywhere or do any activities: for example, accompanying senior citizens when they are running errands, doing mental wellness, recreation, and hobby activities, and going for short or long travel.

iv) Teman at Home: Users can ask caregivers to accompany senior citizens at home and help them with their daily activities, such as dispensing medications, preparing meals, light physiotherapy, companionship, and outdoor activities.

Fig. 2 Interface of the official website of Pearl Caregiver

Pearl Caregiver (Fig. 2) is a web-based system that provides a range of services for people or families who are seeking caregiving assistance for senior citizens. This system offers numerous services, including personal care, companionship, transportation, meal preparation, and medication management. All these services are offered by highly qualified and experienced carers. The following are the services offered by Pearl Caregiver:

i) Stay-in Caregiver: The caregiver will provide full-time care and support to senior citizens at home. They will help senior citizens with daily activities and chores such as preparing meals, getting dressed, bathing, managing medications, and other health-related tasks.

ii) Stay-out Caregiver: On a part-time basis, the caregiver will help and care for senior citizens in their own homes. They could aid with managing medications, mobility, and other health-related duties, as well as assist with activities of daily living, including bathing, dressing up, and preparing meals.

iii) Hospital Sitter: The caregiver will provide ongoing support and will monitor senior citizens at a hospital. The caregiver is typically employed by hospitals or nursing homes to assist patients who require careful supervision because of a medical condition or the possibility of falling or wandering.

Based on the existing system (Table 1), a few aspects are not implemented, which creates flaws within the system. In this case, the existing system does not have login and sign-up features. The user must complete a few pieces of personal information while setting up the booking process, such as name, address, phone number, and medication details. Keeping these personal data confidential and secure is important to protect the user's privacy and prevent unauthorized access. Utilizing sensitive health data and communication platforms within applications carries inherent privacy and security risks for patients because the apps rely heavily on remote online servers, making it possible for unauthorized individuals to observe, modify, or redirect communications through public infrastructure [10]. In addition, users cannot choose the caregiver that they prefer for senior citizens. Choosing the right caregiver for senior citizens can be an important part of the system for several reasons, including personal comfort and preferences. Some senior citizens may have personal preferences that can influence their comfort level while receiving care from someone of the same or opposite gender. Conversely, choosing the right caregiver can maintain the dignity and privacy of senior citizens. If there is no option to choose a caregiver from a specific gender, this can create an uncomfortable situation for senior citizens. For example, if personal tasks may require assistance, such as dressing up and bathing, it would be more appropriate and comfortable if the caregiver is from the same gender.

A mobile application, also called an app, is a category of software created specifically to run on mobile devices such as smartphones and tablets. Two platforms currently dominate the mobile device market: Android by Google, which is supported by various smartphones and gadgets made by Google and other manufacturers, and the IOS platform from Apple Inc., which runs on iPad, iPhone, and Apple Watch. Based on the project scale and the developer's knowledge, the Wise Assist system will develop a mobile application for Android.

TABLE 1. COMPARISON OF EACH EXISTING SYSTEM

System	Teman Malaysia	Pearl Caregiver
Log In	No	No
Type of system	Web-based system	Web-based system
User of the System	Caregiver/ family	Caregiver/ family
Focus Of the System	1) Allow users to book a companion for senior citizens in certain situations, including the following: -health appointments -dialysis treatments -customized activities -companion at home.	1) Provide booking services, including the following: -personal care -meal preparation -medication management -companionship.
Companion approach/package	-For health appointments or checkups, a companion goes directly to the appointment, but if the user requires the caregiver to accompany them during treatment, there is an additional charge. -Charge by the hour.	-For long-term companions, charge monthly. -For short-term companions, charge by the hour.
Period of booking	Short-term and long-term	Short-term and long-term
Option to choose a caregiver	No	No
Transportation service	Yes	Yes
Book on a specific time	Yes	Yes
Payment	Online instant payment	Online instant payment

In general, to provide users with a particular set of functionalities and services on their mobile devices, it is made up of a combination of software elements, infrastructure, and user interfaces. Mobile application systems frequently offer a user-friendly interface that is optimized for touch inputs and smaller screens, allowing users to interact with the features and services of the application without any difficulty. In general, the mobile application is reliable, effective, and simple to use [11].

With the increase in the popularity of mobile applications comes a greater requirement for security. There are a few reasons why the security aspect has become a crucial element in developing mobile applications. This is because mobile devices are usually used by people in public places, where there are more possibilities of being targeted by attackers. In addition, it is usually used to make payments, which makes them a target for fraud. It is also used to store personal information such as videos and contacts. Other than that, sensitive information such as bank data, personal identification numbers, and medical records is frequently stored on mobile devices. If these data are compromised, the user could suffer from terrible consequences.

Whether it is a web-based system or a mobile application, security is one of the most essential aspects when creating any system. In this booking system, users are required to fill in personal data such as phone numbers, addresses, and medication details. Thus, by implementing security measures in the mobile application system, the developers can help protect users' data and prevent unauthorized access.

Password complexity is one of the most crucial elements in protecting mobile application systems. A complicated password might help protect the user's account from unauthorized access because it is challenging to guess or crack. Even if the user's device is lost or stolen, a complicated password can help in preventing unauthorized access to your account. There are a few reasons that password complexity can simply protect a user's account. First, the only barrier between an attacker and your account is a password. However, password-cracking techniques are continually evolving among attackers. Thus, it is crucial to choose strong passwords. A few characteristics of a password should be followed by users when creating a complex password, including the use of at least eight characters and a combination of upper and lowercase letters, numbers, and symbols. The password should not be a phrase or word that is simple to guess, such as your name, birth date, or family member's name. Hence, in this Wise Assist system, a security element that will be applied to secure the user's data is the password complexity element during the login and sign-up phase registration.

II. METHODOLOGY

When developing a mobile application with highly dynamic requirements, an adaptive software development methodology is a crucial element to be highlighted. The software development methodology includes waterfall, agile, and spiral models that developers commonly use in developing mobile application systems. After considering the project scale and the requirements for the development of the system, the methodology chosen for this Wise Assist daily living system for senior citizens is an agile model. Fig. 3 shows the steps of the agile methodology, including planning, designing, and testing before system launching.

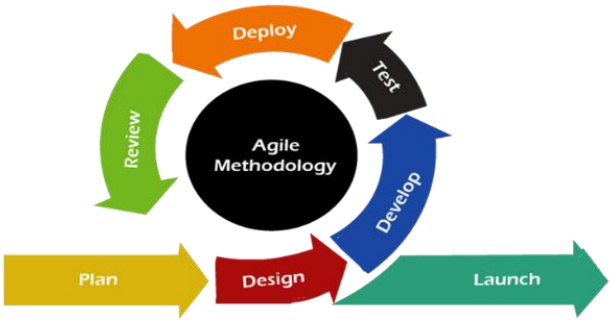


Fig. 3. Agile model

Agile development, also known as an iterative approach, promotes adaptability and flexibility at every process stage. The agile approach to work involves teams that organize themselves and participate in project management responsibilities such as planning and estimating [12]. In this case, developers can obtain feedback from user inputs, learn from their experiences, and make the required improvements as the project develops. By utilizing an iterative process, the shifting needs and new insights regarding the project can be adapted. In addition, through frequent iterations and feedback loops, possible issues can be identified and addressed early, and project risks can be mitigated [13].

The planning phase before the development of any software project is a crucial part for the developer as it is the first step to ensure that the project's purpose becomes clear and well-defined. The research objective of this project is to investigate the needs of caregivers and senior citizens, to use the Wise Assist daily living application for senior citizens, and to ensure that the system works well. Thus, research from a few sources, such as articles, journals, and Google searches, has been used to collect information to meet the project's goal. Throughout the planning phase, two websites were used as a reference for this project and were analyzed to identify the key gaps in the development of the new system.

The goal of the application design is to deliver smooth, simple, and attractive user experiences. The degree to which users utilize and benefit from the features of the mobile application will determine the success of the development process. Developing a mobile application consists of two aspects of design, which are the User Interface (UI) and User Experience (UX) designs. When using a website, app, or other electronic device, users interact with screens, buttons, toggles, icons, and other visual elements referred to as UI. At the same time, UX describes the overall experience of using a product, including the users' feelings during that experience.

Creating engaging user experiences is the aim of mobile app UI and UX designs, making the applications interactive, simple to use, and user-friendly. Although well-designed UIs will aid in early adoption, the app must have simple user interfaces to keep consumers interested. Other than user interfaces, features such as databases are also important in designing the application.

During this stage, elements such as the Unified Modeling Language (UML) or Entity Relationship Diagram (ERD) and flowchart are the basic overview for the developers to discover and visualize the ideas. Hence, UML diagrams and ERD provide a standardized and visual way to represent and communicate the system design.

Wise Assist consists of three different users: the admin, the assistant, and caregiver. Table 2 shows the users and their roles.

TABLE 2. SYSTEM'S USER AND ROLE

User	Role Description
Admin	• Monitor the overall system • Check the user's registration • Update system • Record and access the databases
Assistant	• View task • Update task status • Access the medical information
Caregiver	• Register and login • View services • View assistant • Book assistant

As shown in Fig. 4, caregivers can continue using the application only if they register for an account. After users successfully log in to the system, they can access the system's features.

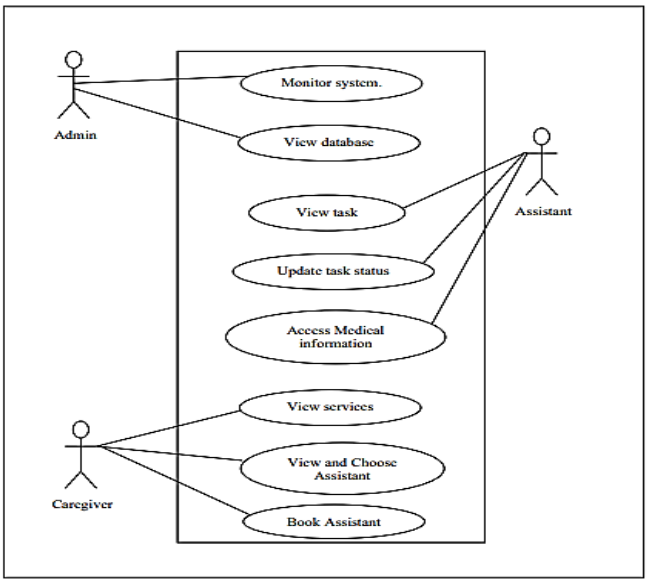


Fig. 4 Use case diagram

Fig. 5 shows the diagram for system database design that describes the relationship between entities from all attributes and entities.

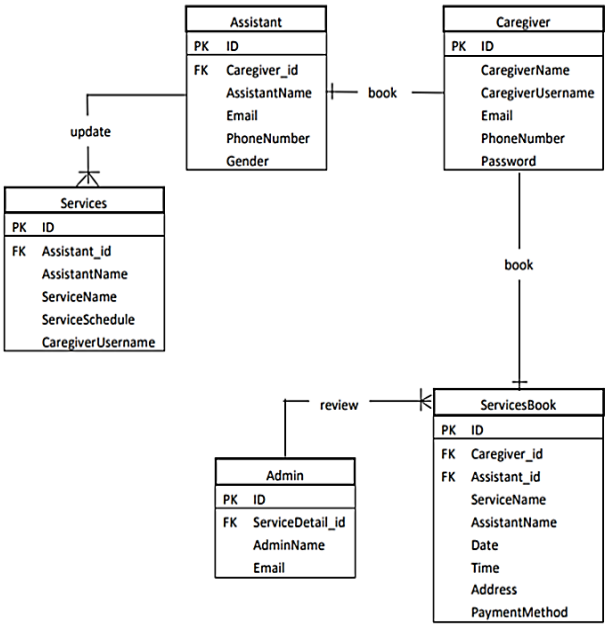


Fig. 5. Entity relationship diagram

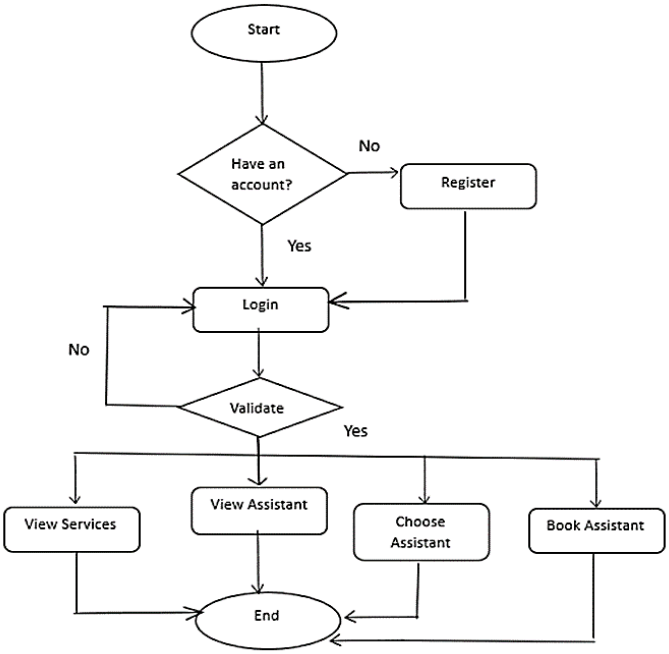


Fig. 6. Caregiver's flowchart

As shown in Fig. 6, caregivers can continue using the application only if they register for an account. After users successfully log in to the system, they can access the system's features and perform the following:

i. View services: A caregiver can view and conduct a survey for the available services that are offered in the system.

ii. View assistant: A caregiver can view the assistant's profile and review the assistant's background.

iii. Choose an assistant: A caregiver can choose any available assistant based on the senior citizens' preferences.

iv. Book assistant: A caregiver can book a suitable assistant for senior citizens.

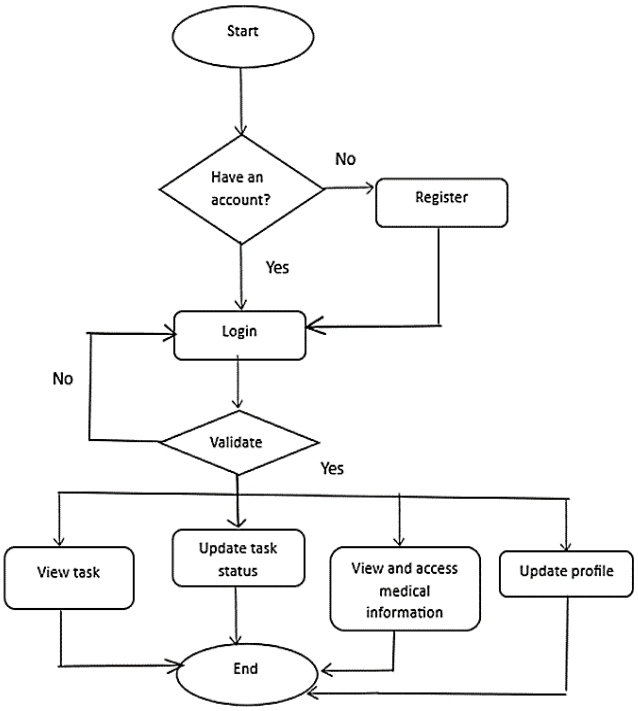


Fig. 7. Assistant's flowchart

Next is the flowchart of the activities of the assistants (Fig. 7). The first part for login and registration is like that of the caregiver's flowchart, but the operations work differently. The operations that an assistant will perform are as follows:

i. View task: An assistant is allowed to view the task assigned to him or her.
ii. Update task status: An assistant can update the status and availability of his or her schedule if the caregiver performs the booking process.
iii. View and access medical information: An assistant will be allowed to access and view the medical information of the senior citizen who is their client.
iv. Update profile: An assistant can update his or her profile information.

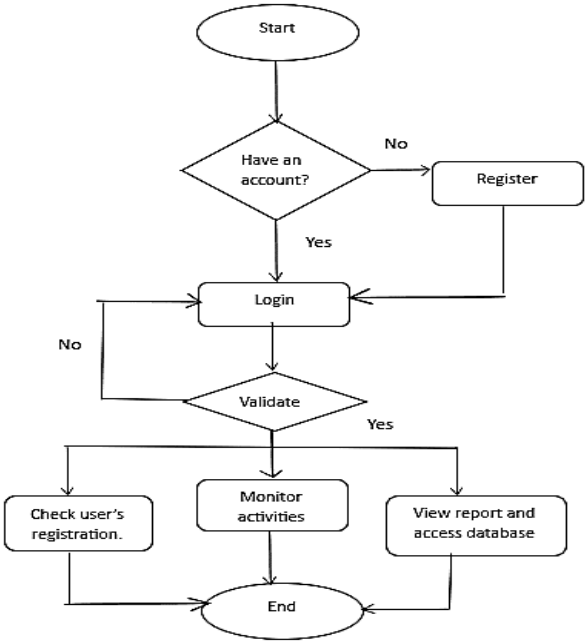


Fig. 8. Admin's flowchart

Fig. 8 shows the admin's flowchart. The login and registration parts are like those of the caregiver's and assistant's flowcharts, but the operations differ.

i. Check the user's registration: An admin can analyze all registered users in the databases.
ii. Monitor activities: All processes that occur throughout the system that are performed by both the caregiver and assistant can be monitored by an admin.
iii. Update system: An administrator will perform any necessary upgrades or maintenance while considering users' comfort.
iv. View report and access the database: An admin can view the report of the databases for the system.

The next phase is the development of the system. In this phase, the features of the prioritized requirements will be implemented. Development projects are broken down into small increments or sprints, which usually run for 1–4 weeks. In addition, delivering a functional subset of features is the main goal of each sprint. Writers of codes integrate their work into the developing system, write unit tests, and produce the coding for the system.

Several programming languages can be used to perform the coding and other development processes for the system. Table 3 shows the software requirements for the application.

TABLE 3. SOFTWARE REQUIREMENTS

Language / Tool	Description
Android Studio	The official Integrated Development Environment for creating Android apps.
Java	Java is the traditional language used for Android app development.
Android Software Development Kit (SDK)	The SDK offers a selection of programs and libraries required for creating Android applications. It contains APIs, emulators, and other tools for creating, testing, and debugging Android applications.
eXtensible Markup Language (XML)	Used to specify how the user interfaces of Android app screens should be laid out. It enables the construction of UI components and their hierarchical organization.
Firebase	Offers features such as push alerts, analytics, a real-time database, cloud storage, and authentication.

The testing phase is the crucial process throughout the development of the system, where developers conduct in-depth testing to identify and fix any bugs or issues in the system. It aims to ensure that the system works well in terms of functionality and can meet all the requirements of the application. The testing performed in this phase includes unit testing, integration testing, and user acceptance testing. Once the product has undergone all necessary testing, the product is ready for deployment to the user.

Maintenance is the last phase of this methodology. Any bugs, errors, or problems discovered during the monitoring and testing phases or reported by users will be fixed during this phase. This phase is important for identifying the processes that need improvement by continual monitoring and analysis.

III. RESULTS

The Graphical User Interface (GUI) is an essential element in developing mobile application systems. The GUI plays a crucial role in the Wise Assist daily living system for senior citizens for several important reasons, including contributing to a positive user experience, usability, and user engagement with the Wise Assist system, and all reasons come from a well-designed GUI. It is essential to ensure the system is simple to use, user-friendly, and consistent with the application's branding and visual style.

Fig. 9 shows the illustration of the prototype for this system's main page. This is the first page that will be displayed for users. Users can click the "Login" button if they already have an account. Otherwise, they can click the "Sign-Up" button to create a new account.

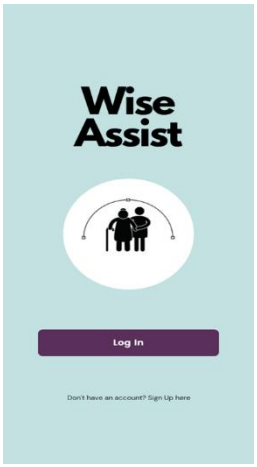


Fig. 9. Main page

Fig. 10 shows the login page for the user, where they must enter their username and password to get access to the main services.

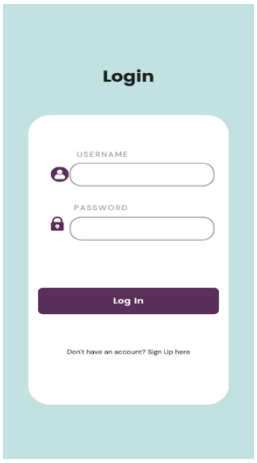


Fig. 10. Login page

Fig. 11 shows the sign-up page where users must create a new account. On this page, users must create a username and password and must enter their e-mail and phone number.

Fig. 11. Sign-up page

Fig. 12 shows the services page, where there are ten services displayed. The services include the following:

i. General Health Checkup
ii. Home Care Service
iii. Diabetes Checkup and an Appointment
iv. Dialysis Appointment
v. Rehabilitation Appointment
vi. Preventive Screening
vii. Hearing Screening
viii. Psychology
ix. Dental Appointment
x. Optometrist Appointment

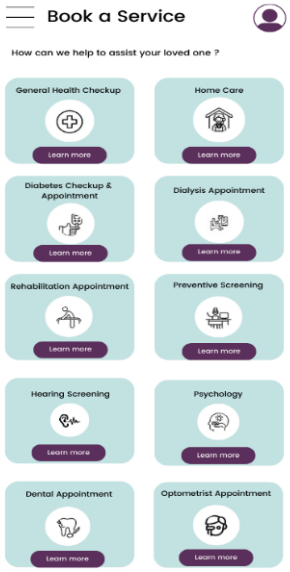


Fig. 12. Services page

Fig. 13 shows the assistant page, which will appear after users choose the service that they want.

After that, the description of the service will be displayed. Users can also view the profile of the assistant to check the details of the assistant.

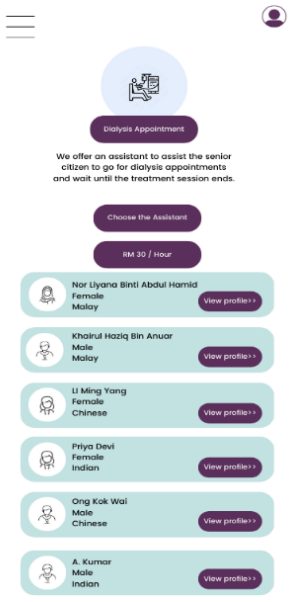


Fig. 13. Assistant page

Fig. 14 shows the profile page of the assistant, which will appear after users choose the desired assistant. The profile and description of the assistant will be displayed. If users are interested in hiring an assistant, they can select book now.

Fig. 14. Assistant profile page

As shown in Fig. 15, users can choose the date and time for the appointment. Users must key in their address and write additional notes for the assistant.

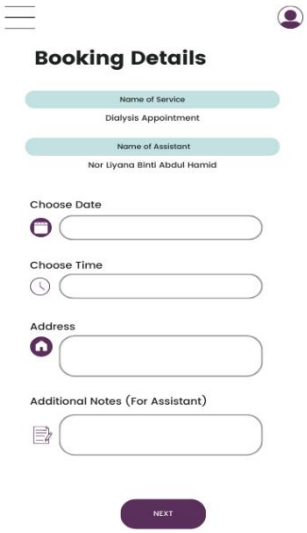


Fig. 15. Booking page

Fig. 16 shows the payment page for users. As mentioned in Chapter 1, although the system lists the payment option for online banking, it will not be using a third-party platform such as FPX but an alternative approach that involves uploading transaction receipts as proof.

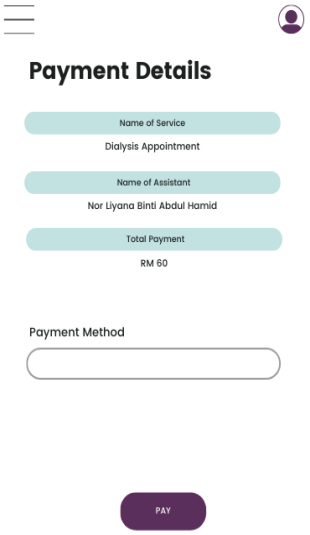


Fig. 16. Payment page

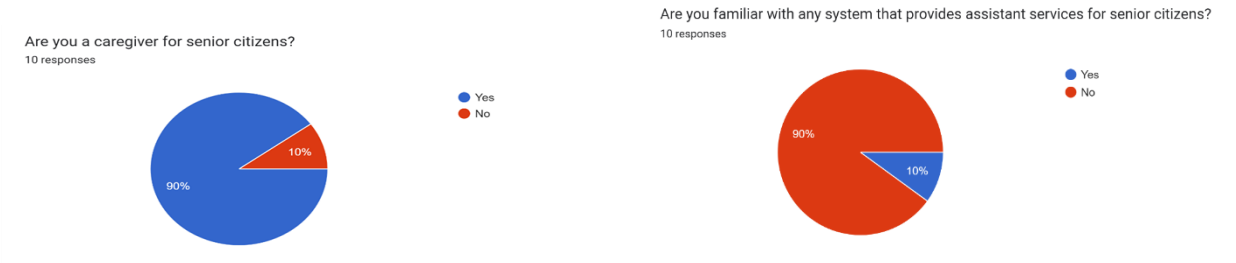
IV. SYSTEM TESTING AND EVALUATION

The system testing for the Wise Assist Daily Living system is briefly covered in this chapter. The main objective of this system testing is to ensure that any flaws in the application are identified and addressed early, ensuring that the target user of this system can reach a solid and reliable user experience. Throughout this chapter, the specific testing methodology is examined, and the key performance indicators are monitored to enhance the overall functionality and user interface of the Wise Assist application.

User Acceptance Testing (UAT) is a practical examination or in a simpler way, it is a hands-on analysis that involves the evaluation of the proposed method by the end-users. The main objective of this (UAT) is to ensure the system functions seamlessly and meets all the user's expectations. Obtaining project files for a more thorough assessment, allowing a user, especially the caregivers, to engage with the system directly from the developer's environment, and viewing a demonstration video of the system in operation are all part of the testing procedures. After going through all the procedures and answering a questionnaire, the user evaluates it.

A feedback form has been created so that the user can evaluate the system. Several random individuals come from a caregiver, and non-caregivers test the user interface of the system. The feedback form consists of three parts. Part A: User background and familiarity with the system, Part B: User testing for graphical user interface (GUI), and Part C: User testing for the system's functionality.

Figures 17(a) and (b) illustrate that most respondents undergoing system testing belong to the caregiver category. Regarding familiarity with the system, it is evident that many individuals are not acquainted with any assistance service for senior citizens, indicating a demand for such systems. This suggests that systems catering to the needs of senior citizens are in demand, and currently, there are not many alternatives available in the market.



(a) Respondent's status senior citizens

b) Respondents familiarise themselves with the system that aids services for

Fig. 17. Respondents undergoing system testing belong to the caregiver category.

As depicted in Figure 18, a significant proportion of respondents express satisfaction with the design of the system. This proved that the arrangement of information and data flow is well-organized for users. The utilization of pictures, typography, and themes in the system is visually pleasing, contributing to their overall positive experience, and the system's simplicity enhances its usability.

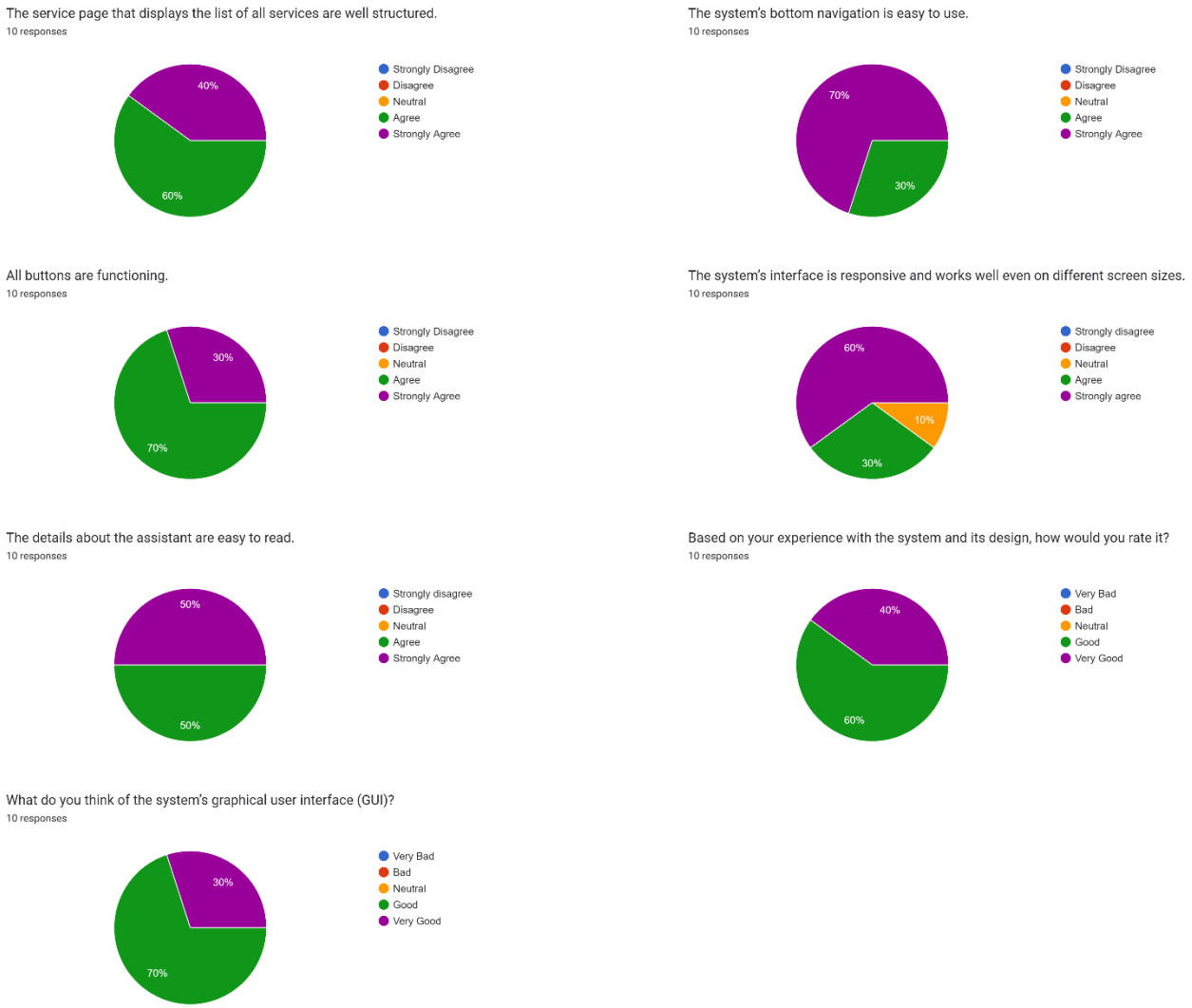


Fig. 18. GUI User Acceptance Testing Result

Fig. 19 shows that there are no malfunctions or failures because of any of the system's features and functionalities. The feedback form asks about each function, and most of the respondents say they are satisfied or very satisfied with the features of the system.

Fig. 19. System's Functionality User Acceptance Testing Result

V. CONCLUSIONS

This paper discusses a mobile application system that uses the booking system to book assistance for senior citizens and medication reminders that apply security aspects in protecting user personal data and databases.

This mobile application will include the basic security of a system with login and sign-up features to allow users to continue using the system. The type of appointment or health checkup will appear, and users can choose the type of services that they need. The date and time will also appear in the users' interface, where they can choose and decide on a suitable schedule for senior citizens. Users can also choose an assistant to assign to senior citizens so that they can have a trusted and suitable assistant who can meet the needs and preferences of the users.

This research will not include feedback on the services performed by the assistant who will care for senior citizens. However, users can review the assistant's profile and choose the one that meets their preferences. Next, although the system lists the payment option for online banking, it will not use a third-party platform such as FPX but an alternative approach that involves uploading transaction receipts as proof.

This application prioritizes the creation of an innovative way to support and improve the quality of life of senior citizens. This mobile application provides a platform for caregivers to simply book professional assistant services, making their lives easier in caring for senior citizens and monitoring their well-being. Even when caregivers have work commitments or other responsibilities, it provides a practical and effective way to ensure senior citizens receive the necessary support, such as a companion to attend medical appointments and company at home.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this paper.

ACKNOWLEDGEMENT

We thank everyone who provided insight and expertise that greatly assisted the research, although they may not agree with the interpretations and conclusions of this paper. We thank the reviewers, proofreaders, and the handling editor for the comments that greatly improved the manuscript.

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