De La Salle University - Dasmariñas
College of Engineering, Architecture and Technology
Computer Engineering Department

"Developing an E-booklet System for Senior Citizen Access"

A Thesis Presented to the Faculty of Computer Engineering
College of Engineering, Architecture and Technology
De La Salle University - Dasmariñas
Dasmariñas, Cavite

In Partial Fulfilment of the Requirements for the Degree of
Bachelor of Science in Computer Engineering

Arada, Alyanna Ajay
Alecha, Drew Cedrick
Nueva, Christine Grace

May 2024

DE LA SALLE UNIVERSITY – DASMARINAS
Dasmarinas City, Cavite
College of Engineering, Architecture and Technology

APPROVAL SHEET

The undergraduate thesis proposal entitled **"Developing an E-booklet System for Senior Citizen Access"** prepared and presented by Arada, Alyanna Ajay M., Alecha, Drew Cedrick, Nueva, Christine Grace on an Oral Defense last 05/02/2024 has been examined and is recommended for approval and acceptance in T-CPET322 Methods of Research.

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DE LA SALLE UNIVERSITY – DASMARINAS
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Engineering Department
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Name: _____

Age: ____

Gender: _____

Address:
_____
_____

Technology Experience

1. How would you rate your familiarity with digital devices and technologies? *(Paano mo i-rate ang iyong pamilyar sa mga digital na aparato at teknolohiya?)*
   - Not familiar at all *(Hindi pamilyar sa lahat)*
   - Somewhat familiar *(medyo pamilyar)*
   - Very familiar
2. How often do you use a smartphone or tablet? (*Gaano kadalas mo ginagamit ang isang smartphone o tablet?)*
   - Daily
   - Weekly
   - Monthly
   - Rarely
   - Never
3. How would you rate your overall experience with technology? *(Paano mo ire-rate ang iyong pangkalahatang karanasan sa teknolohiya?)*
   - Excellent
   - Good
   - Average
   - Poor
   - Very poor

Experience with Traditional Booklets

4. How often do you use your senior citizen booklet? *(Gaano kadalas mo ginagamit ang booklet ng iyong senior citizen?)*
   - Daily
   - Weekly
   - Monthly
   - Rarely
   - Never
5. Have you ever experienced any issues with your traditional senior citizen booklet, such as: *(Nakaranas ka na ba ng anumang mga isyu sa iyong tradisyonal na buklet ng senior citizen, tulad ng:)*
   - Limited space to record information.
   - Risk of losing the booklet
   - Difficulty updating information.
   - Inconvenience of writing information
   - Delayed updates from the local government
   - None of the above
6. How convenient is the current process of collecting your information through face-to-face interviews with local government officials? *(Gaano kadali ang kasalukuyang proseso ng pagkolekta ng iyong impormasyon sa pamamagitan ng harapang panayam sa mga opisyal ng lokal na pamahalaan?)*
   - Very convenient
   - Somewhat convenient
   - Neutral
   - Somewhat inconvenient
   - Very inconvenient

E-booklet System Preferences

7. How interested are you in using an e-booklet system designed specifically for senior citizens? *(Gaano ka interesado sa paggamit ng isang sistema ng e-booklet na partikular na idinisenyo para sa mga senior citizen?)*
   - Very interested
   - Somewhat interested.
   - Neutral
   - Not very interested
   - Not interested at all
8. What features would you like to see in an e-booklet system for senior citizens? (Select all that apply) *(Anong mga tampok ang gusto mong makita sa isang sistema ng e-booklet para sa mga senior citizen? (Piliin ang lahat ng naaangkop)*
   - Ability to store and access multiple booklets.
   - Automatic updates and notifications
   - Ability to share booklets with family members or caregivers.
   - Large font size and high-contrast display
   - Simple and intuitive navigation
   - Other (please specify):
     _____
     _____
9. What concerns, if any, do you have about used an e-booklet system? (Select all that apply) *(Ano ang mga alalahanin, kung*

mayroon man, mayroon ka tungkol sa ginamit na sistema ng e-booklet? (Piliin ang lahat ng naaangkop)

- Difficulty learning how to use the system.
- Lack of technical support or assistance
- Privacy and security concerns
- Preference for traditional physical booklets
- Concerns about the reliability and durability of electronic devices
- Other (please specify):

_____

10. Do you have any additional comments or suggestions regarding the development of an e-booklet system for senior citizens? *(Mayroon ka bang anumang karagdagang mga komento o mungkahi tungkol sa pagbuo ng isang e-booklet system para sa mga senior citizen?)*

_____
_____
_____

.84

Pharmacy Form

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Engineering Department
Computer Engineering Program

Name: _____

Age: ____

Gender: _____

Location of the store:
_____

Current System and Challenges

1. How do you currently manage records and information related to senior citizen benefits, discounts, and medication information in your pharmacy?
   - Traditional paper-based system (e.g., booklets, cards)
   - Electronic database system
   - Other (please specify):
     _____
     _____
2. How often do senior citizens present their traditional booklets at your pharmacy?
   - Daily
   - Weekly
   - Monthly
   - Rarely
   - Never
3. What are the main challenges or limitations you encounter with the current system for managing senior citizen records? (Select all that apply)
   - Limited storage capacity
   - Risk of booklet loss or damage
   - Delayed updates on information
   - Inconvenience of writing information
   - Other (please specify):
     _____
     _____

Technology Experience

4. How would you rate your pharmacy's overall experience with technology?
   - Excellent
   - Good
   - Average
   - Poor
   - Very poor
5. Does your pharmacy currently use any electronic or digital systems for record-keeping or patient management?
   - Yes
   - No

E-booklet System Preferences

6. How interested would you be in adopting an electronic e-booklet system specifically designed for managing senior citizen records in your pharmacy?
   - Very interested
   - Somewhat interested
   - Not interested
   - Unsure
7. What features would you like to see in an e-booklet system for managing senior citizen records in your pharmacy? (e.g., easy data entry, automatic updates)
   - Easy data entry
   - Automatic updates on benefits and discounts
   - Integration with existing pharmacy software
   - Accessible interface for senior citizens
   - Other (please specify):
     _____
     _____
8. What concerns, if any, do you have about implementing an e-booklet system for senior citizens? (Select all that apply)
   - Cost of implementation and maintenance
   - Training and adoption by pharmacy staff
   - Privacy and security concerns
   - Compatibility with existing systems
   - Resistance from senior citizens to adopt new technology
   - None
9. Do you have any additional feedback or suggestions for improving the management of senior citizen records through an e-booklet system in pharmacies?
   _____
   _____
   _____
   _____

APPENDIX B: ADVISER ENDORSEMENT SHEET

DE LA SALLE UNIVERSITY – DASMARINAS
Dasmarinas, Cavite
College of Engineering, Architecture and Technology
Engineering Department
Computer Engineering Program

ADVISER'S ENDORSEMENT FORM

April 26, 2024
Date

Prof. Kathleen Ann Villanueva
Subject Teacher CPE/ CEAT

I have evaluated the thesis study entitled *"Senior Citizen Accessibility: Developing an Electronic Booklet System using Biometrics"* by the following students Alyanna Ajay Arada, Drew Cedrick Alecha, and Christine Grace Nueva.

As their adviser, I fully endorse their thesis manuscript and allows them to present in an oral presentation (proposal, final) this 2nd semester of SY 2023 to 2024 .

Prof. Joshua Isaguirre
Thesis Adviser

<Name of co-Adviser>
Thesis co-Adviser

LIST OF FIGURES

GANTT CHART

	MONTH	FEBRUARY				MARCH				APRIL				MAY			
CODE	WEEK	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
A	Brainstorming of Research Topics	■															
B	Research Topics (Finalized)		■														
C	Research Title			■													
D	Chapter 1				■	■											
E	Topic Proposal Defense						■										
F	Revised Chapter 1							■	■								
G	Adviser Form								■								
H	Chapter 2									■	■	■					
I	Chapter 3												■	■	■		
J	Final Revisions															■	
K	Thesis Defense																■

CHAPTER I

INTRODUCTION

1.1 Background of the Study

Individuals aged 60 and above in the Philippines are classified as senior citizens according to Republic Act 9994, also known as the Expanded Senior Citizens Act of 2010 (Zoleta, 2023). This Act entitles senior citizens to various benefits, including medicine discounts. Specifically, the law mandates a 20% discount and a 12% Value Added Tax (VAT) exemption on both generic and branded medicines (Forest Lake Parks, 2023). To avail these benefits, senior citizens must present their senior citizen identification card and booklet to pharmacy cashiers. These documents are issued by the Office of the Senior Citizens Affair (OSCA) (GOVPH, 2022). Additionally, a 50% discount is available for medicines related to top chronic diseases such as cancer, hypertension, diabetes, kidney diseases, and pulmonary diseases under Executive Order No. 1044 (Forest Lake Parks, 2023).

The senior citizen booklets are used to record purchase transaction details when buying medicines, a requirement under the Expanded Senior Citizens Act of 2010 (FDA, 2024). Pharmacy cashiers are tasked with writing these details and monitoring the latest purchase information of senior citizens (FDA, 2021). When the booklets are full, they must be returned to OSCA for recording and monitoring purposes (GOVPH, 2022).

However, traditional booklets face significant challenges. For senior citizens, these include physical accessibility issues, delayed information updates, and the potential for loss. Senior citizens must physically visit OSCA to replace

full booklets, which can be burdensome. Delayed information updates occur when pharmacy cashiers manually enter purchase details, leading to potential errors and slow updates. Additionally, there is a risk of booklet loss, which can result in missed opportunities to avail benefits (De Layola, 2024).

Pharmacy cashiers also encounter several challenges, including the risk of booklet loss or damage, limited storage capacity, delayed updates on information, and the inconvenience of writing information. The pre-survey conducted by the researchers identified these as key issues faced by pharmacy cashiers. They must manually write and update purchase information, which can be time-consuming and error-prone, and they can only monitor senior citizens' purchase information when the booklets are physically presented at the pharmacy.

Local government officials have expressed concerns regarding the use of traditional senior citizen booklets, highlighting their inconvenience. Flores (2024) reports that the National Commission of Senior Citizens (NCSC) advocates replacing the purchase booklet with a digital database accessible to all participating retailers. Gonzales (2022) emphasizes the importance of honoring senior citizen discount cards and addresses challenges when establishments do not comply. This aligns with the study's proposal for an electronic biometric solution, which aims to streamline access to discounts and services. De Layola (2024) notes that the Department of Social Welfare and Development - Population Management Bureau (DSWD-PMB) recommends digitizing records for senior citizens, citing the inconveniences of traditional booklets. The DSWD-PMB supports a digital system for efficient and uniform implementation of laws and availability of benefits.

Additionally, many senior citizens are not tech-savvy, complicating their interaction with technological devices. The proposed solution in House Bill 9704 aligns with leveraging technology to enhance senior citizens' experience, recognizing the transformative impact of such innovations on service quality. The commitment to digital inclusivity, user-friendly interfaces, and alternative means for seniors without digital access mirrors the study's dedication to creating a more user-friendly and inclusive environment.

In conclusion, the challenges faced by senior citizens and pharmacy cashiers in using traditional booklets for recording medicine purchases and availing discounts underscore the need for a more efficient and accessible system. The proposed digital solution, which aligns with recent legislative developments and societal observations, aims to create a more user-friendly and inclusive environment for senior citizens. By leveraging technology, the system can streamline access to discounts and services, address the limitations of traditional booklets, and enhance the overall experience of senior citizens.

1.2 Statement of the Problem

The main problem addressed by this study is to develop and implement an electronic Senior Citizen Booklet system that overcomes the limitations of traditional booklets such as physical accessibility, delayed information updates, and the potential for loss on the part of the senior citizens and risk of booklet loss or damage, limited storage capacity, delayed updates on information, and inconvenience of writing information on the part of the pharmacy cashiers.

1.3 Objectives of the Study

The primary objective of this study is to develop an Automated Senior Citizen Purchase and Discount System that integrates biometrics, web application features, and a database to provide a secure, convenient, and accessible method for senior citizens to purchase discounted medicines, enhancing their overall user experience and addressing the challenges associated with traditional booklets.

Specific Objectives:

- To implement a fingerprint scanner to provide a more secure and convenient method for user identification, particularly for senior citizens.
- To design a web application with a phone camera-based registration process for easy access, especially for senior citizens. It includes discount computation, user data management, a shopping cart, admin features, security measures, and verification for a user-friendly and secure transaction management system.
- To develop a database that stores relevant information including users' personal details (name, address, medical records, emergency contacts, validation IDs), transaction records of senior citizens, and a separate database for pharmacy cashiers with information about their pharmacy location and name.
- To test the system's functionality, ensuring it remains operational even when the internet or Wi-Fi is down by incorporating offline capabilities, and to evaluate the system's accuracy and user-friendliness for both senior citizens and pharmacy cashiers

1.4 Significance of the Study

This study is important as it has the potential to transform how senior citizens manage and access crucial information. By introducing an electronic booklet system using biometrics, the study addresses the problems associated with traditional booklets, providing improved accessibility, timely updates, and user-friendly features. This innovation offers senior citizens a more effective and simple way to obtain important information, significantly enhancing their quality of life. The proposed method not only improves accessibility and usability but also allows for upgrades and modifications based on individual needs. This adaptability can greatly enhance the quality of life for older persons by giving them more control over their information and daily routines.

Moreover, the incorporation of encryption and authentication mechanisms ensures the security and confidentiality of sensitive data, instilling confidence in seniors regarding the protection of their personal information. This aspect underscores the system's commitment to safeguarding privacy and maintaining trust in the digital environment.

Additionally, the study includes a separate database for pharmacy cashiers with information about their pharmacy location and name. This feature enables efficient management and tracking of discounted medicine purchases by senior citizens, ensuring accurate record-keeping and facilitating the smooth processing of transactions at pharmacies. By addressing the needs of pharmacy cashiers, the system aims to create a comprehensive and user-friendly solution for all stakeholders involved in the senior citizen discount program.

1.5 Scope and Limitation

The primary scope of this study is centered around the design, development, and implementation of an electronic Senior Citizen Booklet based on website application with the use of biometrics and specifically catering to the community in Pasong Buaya 2, Imus, Cavite. The project aims to enhance information retrieval and accessibility for senior citizens in this locality, emphasizing user-friendly interfaces and timely updates to overcome challenges associated with traditional booklets.

Key features and functionalities of the study system include:

- **Biometric Authentication:** Implementing fingerprint scanning technology for secure and efficient user identification.
- **Phone camera-based Registration:** Allowing users to register by capturing their images, which enhances the ease and accessibility of the registration process.
- **Information Management:** Facilitating the storage and retrieval of crucial user information, including personal details, medical records, and transaction history.
- **Timely Updates:** Ensuring that senior citizens have access to the most up-to-date information regarding their benefits and discounts.
- **User-Friendly Interface:** Designing intuitive interfaces to cater to the needs of senior citizens, ensuring ease of navigation and interaction.
- **Offline Functionality:** Ensuring the system remains operational even when the internet or Wi-Fi is unavailable, with features for offline data entry

- **Medicine Discount Processing:** Streamlining the process of availing discounts on medicine within the Pasong Buaya 2 community, thereby enhancing accessibility for senior citizens.

However, certain constraints must be acknowledged:

- **Age Limitation:** The system is specifically designed for senior citizens; 60 years old and above, and its features are tailored to their needs and abilities. The usability and functionality may not be suitable for other age groups.
- **Technological Familiarity:** Elderly individuals may face challenges in adapting to digital technologies. This could impact the effectiveness of the system for users who are not technologically inclined.
- **Physical Limitations:** The system may not be fully accessible to elderly individuals who are unable to leave their homes due to physical disabilities, chronic illnesses, or frailty. Additional measures, such as home-based services or mobile assistance, might be necessary to ensure inclusivity.
- **Geographic Limitation:** The project's scope is specifically limited to Pasong Buaya 2, Imus, Cavite. The study will focus solely on parameters related to discounts for medicine within this community. While the project significantly contributes to enhancing the efficiency of senior citizen services in this specific area, it may not comprehensively address all aspects of the broader senior citizen support ecosystem beyond the specified parameters and geographic location.

1.6 Conceptual Framework

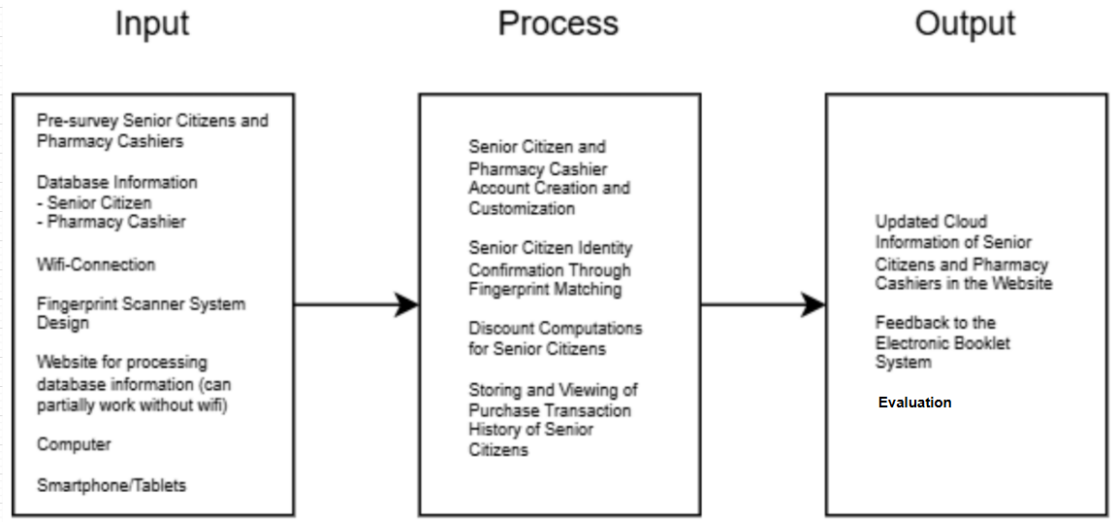

Figure 1.1: Conceptual Framework

The proposed framework modernizes the way senior citizens access discounts and manage information, shifting from traditional booklets to a biometric-based electronic booklet system. This system aims to address the challenges faced by senior citizens and pharmacy cashiers with traditional methods by leveraging technology to improve efficiency, security, and user experience.

Initially, a pre-survey was conducted among senior citizens and pharmacy cashiers to gather information about the challenges associated with the traditional booklet system. This data will be used for the design of the electronic booklet system, ensuring it aligns with user preferences. Essential inputs for the system include detailed information from senior citizens, such as basic identity details, medical records, emergency contacts, and fingerprint data. Similarly, information about pharmacy cashiers, including their pharmacy location and name, will be collected. The data collection for the information of

the senior citizens will be done by writing a letter to barangay officials asking for records of senior citizens in their community. The data collection for the pharmacy cashier only includes the pharmacy name and location which can be searched through Google maps. Technical components necessary for the system include a Wi-Fi connection, fingerprint scanner, website for processing database information (with offline capabilities), and computer devices.

The electronic booklet system encompasses several processes. Firstly, it facilitates the creation of accounts for both senior citizens and pharmacy cashiers. The data collected from the barangay officials will verify the authenticity of senior citizens registered on the website. If the basic information of senior citizens exist on the data collected, the senior citizens will be able to create their accounts on the website, however, if not, the senior citizens will not be able to have their own accounts. The purpose of this is for confirming whether the person is a senior citizen or not. Also, for security purposes, there will be one-time-password authentication every time senior citizens login through their accounts. Identity confirmation during purchase of medicines for senior citizens is achieved through fingerprint matching during transactions, ensuring secure and accurate verification. Pharmacy cashiers will record the transaction details of senior citizens, including the automatic computation of discounts. Users can also manage their profiles by uploading images. Senior citizens will be able to view their purchase transaction details and basic identity information, while pharmacy cashiers will have access to the transaction details of senior citizens who have purchased medicines from their pharmacies. The system allows for offline access, enabling users to save their information locally when the internet is unavailable, with data being uploaded to the cloud once connectivity is restored.

The output of the electronic booklet system includes an up-to-date database of senior citizens and pharmacy cashiers' information, maintained in the cloud. Additionally, the system will be evaluated on its functionality, accuracy, and user-friendliness to ensure it meets the needs of all users. This comprehensive approach aims to provide a streamlined, secure, and efficient method for managing senior citizen discounts and transactions, significantly enhancing the overall user experience and addressing the limitations of traditional booklets.

1.7 Definition of Terms

- Senior Citizen Booklet Electronic: An electronic resource for seniors to provide access to vital information on smartphones or other electronic devices.
- Biometrics: The measuring and study of distinctive physical or behavioral features, particularly as a way of validating personal identity.
- Fingerprint scanners: A hardware used to capture the biometric for verification of a person's identity.
- User-friendly Interface: An interface that takes into account the unique requirements and preferences of senior persons while yet being simple to use and navigate.
- Updates: The electronic booklet system is updated frequently to guarantee that seniors always have access to the most recent data.
- Information retrieval: process of using Biometrics to access important information.
- Security Measures: Procedures and systems put in place to safeguard private data in the electronic booklet.

CHAPTER II

REVIEW RELATED LITERATURE

In this chapter 2, a comprehensive exploration of senior citizen accessibility is undertaken, focusing on innovative solutions to challenges inherent in traditional service systems. The analysis delves into both local and international literature to understand the complexities of senior welfare. Despite abundant literature, careful selection offers insights into challenges and avenues for improvement. The evaluation of these sources aims to inform the proposed electronic system, making this review a crucial foundation for the study's progression.

2.1 Senior Citizenship

2.1.1 Benefits of a Senior Citizen

Kattouw et al. (2023) conducted a study exploring the perspectives of various stakeholders on the preferred service ecosystem for senior citizens living at home. This qualitative research involved interviews with four stakeholder groups in a Norwegian municipality: senior citizens, carers, healthcare professionals, and managers. The findings revealed six key themes, highlighting the importance of supporting senior citizens' autonomy, providing practical and social support services, planning age-friendly infrastructures, and relying on compassionate and competent healthcare professionals to meet senior citizens' needs.

Similarly, Senior Services of America (2024) outlines the array of benefits enjoyed by senior citizens in the United States, including free or reduced-cost services in healthcare, transportation, housing, prescription drugs, food and dining, and recreational activities. In the Philippines, senior citizens benefit from Republic Act 9994 (Expanded Senior Citizens Act of 2010), which grants privileges such as medical discounts, transportation benefits, entertainment perks, and utility discounts. Medical privileges include a twenty-percent discount and a twelve-percent Value Added Tax (VAT) exemption for medicine purchases, with additional discounts for medicines related to top chronic diseases.

Zoleta (2023) provides insights into the senior citizen discount system in the Philippines, regulated by Republic Act 9994. This legislation offers a wide range of privileges, including tax exemptions, free medical services, educational assistance, and discounts on various goods and services. Notably, senior citizens are entitled to PhilHealth coverage, discounts on hospital fees, and commuting benefits. Zoleta emphasizes the importance of familiarizing oneself with these entitlements to ensure seniors receive their full benefits under the law.

2.1.2 Requirements for Senior Citizenship

Accessing benefits for senior citizens in the United States of America requires obtaining a senior citizen identification card. Senior Services of America (2024) outlines the process, indicating that individuals can apply for this card through their official state government website or via online applications. The application typically requires proof of residency, an old identification card, and documentation to verify age and identity, as highlighted by Beagle (2021).

Similarly, in the Philippines, senior citizens must apply for a senior citizen identification card and a purchase booklet to access benefits. These documents are necessary when purchasing items like medicine and food products to avail of discounts. Application procedures typically involve submitting required documents to the City Social Welfare and Development Office for approval, as stated by GOVPH (2022).

2.2 Senior Citizen Booklet

2.2.1 Purpose

One of the purposes of the senior citizen booklet is to let the drugstores monitor the latest information on the purchase of medicine by senior citizens (FDA, 2021). Another purpose of the records is to confirm whether pharmacies are adhering to the Republic Act No. 9994 which states that all pharmacies and drugstores are mandated to provide a 20% discount on medications bought by Senior Citizens upon submission of the specified documents. Violations will result in sanctions and penalties as outlined in Section 7 of RA No. 9994, which amends Section 10 of RA No. 9257 in connection with Section 6 of the same law. Senior Citizens are reminded to have their Purchase Slip Booklets ready for documentation of their OTC medicine purchases, including details such as type, quantity, date, and place of purchase as per Section VI.6.1.c of the mentioned AO. (FDA, 2024).

2.2.2 Problems

The Department of Social Welfare and Development (DSWD) has expressed support for abolishing the senior citizen's purchase slip booklet, aligning with proposals from lawmakers Erwin Tulfo and Stella Quimbo.

Secretary Rex Gatchalian affirmed the DSWD's collaboration with the Department of Health (DOH) and other agencies to transition to digitized records, addressing concerns over inconvenience and forgetfulness associated with the booklet (De Layola, 2024). Milagros Aquino-Magsaysay, a United Senior Citizens Party-list Representative, advocates for replacing booklets with online platforms to record purchase history, streamlining processes for senior citizens (Barro, 2024). Mark Go, a district representative from Baguio City, has filed a resolution urging the Department of Health to abolish the use of senior citizen booklets when purchasing medicines (Parungao, 2024).

Despite legislative measures like Republic Act No. 9994, reports of establishments failing to comply with regulations persist, highlighting the need for improved implementation. Challenges include unclear rules, fake IDs, and misuse of discounts, particularly in restaurants. Clearer guidelines and stricter enforcement are necessary to ensure benefits reach the intended recipients (Manila Bulletin, 2024; San Pedro, 2022).

Issues with the senior citizen booklet extend to the possibility of loss and the cumbersome acquisition process. Zaragosa et al. (2022) and Tanio (2021) address these concerns by developing computer-based systems to improve information sharing among senior citizens, emphasizing efficiency and accuracy in record-keeping. These studies underscore the importance of leveraging technology to address the evolving needs of elderly populations and streamline administrative processes.

2.3 Online Identification Card Systems

Senior Citizens Partylist Rep. Rodolfo Ordanes proposed integrating the application and issuance of senior citizen identification cards through the eGov PH Super app system, aiming to enhance convenience and accessibility for the elderly. The bill envisions a dedicated section within the app platform for senior citizens, facilitating ID card applications and providing access to tailored government services such as healthcare and social services. Ordanes emphasized digital inclusivity and accessibility, ensuring that senior citizens have access to information, resources, and services through user-friendly interfaces. However, physical applications through local government units remain available as an alternative (Cervantes, 2023).

Kaushik (2022) underscores the significance of digital literacy for senior citizens, particularly those living alone or in remote areas, as it enables them to stay connected with loved ones and engage with modern trends. Digital literacy empowers seniors to live independently despite mobility constraints, facilitating tasks from the comfort of their homes. However, challenges persist, especially in areas with low literacy rates.

Teleron (2022) introduces a study on streamlining pharmacy management through Operations Research for Pharmacy Management Information Systems (PMIS). The study addresses challenges like manual record-keeping and stock management, aiming to automate pharmacy operations with a user-friendly PMIS. Utilizing the Rapid Application Development (RAD) model, the system offers features for order management, sales monitoring, and prescription recording. Testing in a pharmacy setting evaluates its effectiveness in managing purchases and generating accurate reports.

The National Commission of Senior Citizens (NCSC) advocates for replacing the senior citizen's purchase booklet with a centralized database accessible to participating merchants. This recommendation arises from inefficiencies in the current system mandated by Republic Act 9994. NCSC Chairman Franklin Quijano highlighted limitations of the booklet, including forgetfulness and environmental concerns. The proposal aims to streamline processes and improve accessibility for senior citizens entitled to discounts and tax exemptions under RA 9994 (Flores, 2024).

Almao & Golpayegani (2019) examine the usability and accessibility of mobile applications (Apps) for senior citizens in smart cities. The study emphasizes designing accessible mobile interfaces considering cognitive changes with aging. It evaluates industry-built Apps' implementation of design guidelines and discusses research-based principles for age-friendly interfaces. Through expert evaluation, the study assesses Apps' accessibility features, highlighting the need for inclusive design in enhancing usability for senior citizens in smart cities.

2.4 Fingerprint Biometrics Identification

McDonald (2023) posits fingerprint biometrics as a foundational technology, leveraging the unique physical attributes inherent in an individual’s fingerprints to ensure robust authentication and access control. Unlike traditional identity cards, fingerprint biometrics offers a more reliable identification method, eliminating concerns such as misplacement or theft. This innovative approach aligns seamlessly with the project's goal of enhancing

accessibility for senior citizens, providing them with a secure and user-friendly means of accessing essential electronic booklets. With each person's fingerprint serving as a distinctive and reliable identifier, the system establishes a robust barrier against unauthorized access to sensitive data, underscoring its commitment to safeguarding user privacy and security.

Rai (2020) emphasizes the importance of integrating verification and authentication functionalities within biometric systems to ensure robust security and usability. Verification confirms an individual's identity by comparing their biometric data, such as fingerprints, against stored templates, while authentication grants access based on the confirmed identity.

By incorporating both verification and authentication capabilities, the system offers a comprehensive approach to access control. For senior citizens using the electronic booklet system, this translates to seamless and secure access to their resources. Verification ensures accurate identification of each user, while authentication ensures only authorized users gain access to sensitive information.

Fingerprint-based identification is among the oldest and most widely used biometric methods, renowned for its accuracy, uniqueness, permanence, and cost-effectiveness (Omonayajo, 2021). Fingerprint scanners capture unique patterns, which are then compared using algorithms to verify identity. Major applications include forensics, border security, national IDs, and mobile unlocking and payments.

Forensics and border security agencies, such as the FBI and OBIM, utilize advanced fingerprint identification systems like IAFIS and NGI to digitize, store, and compare fingerprints for criminal identification and border control purposes. National ID systems like India's Aadhaar system utilize fingerprint recognition alongside iris and facial recognition to provide unique identification linked to a national database, facilitating financial transactions and social benefits distribution. Moreover, fingerprint recognition is widely used in modern smartphones, with approximately 60% of smartphones equipped with fingerprint recognition technology for unlocking and payment services (Engelsma, 2021).

A fingerprint recognition device typically comprises electronic components including screens, a processor, memory, and specialized software for capturing and comparing fingerprint patterns. The software processes fingerprint information to create pre-stored templates, which are then compared to new fingerprint patterns for identification purposes (USPTO Patent Applications, 2024).

Similarly, fingerprint attendance systems operate on the principle of fingerprint verification, capturing an individual’s fingerprint and comparing it to pre-existing databases for identification. These systems employ fingerprint scanners to capture and store fingerprint patterns, subsequently comparing them for identity verification (Vidyalaya, 2023).

2.5 Additional Insights

Paguirigan (2019) provides an in-depth examination of services available to older individuals in the Philippines, focusing on legal regulations,

entitlements, and institutional operations. The chapter highlights the significance of the Expanded Senior Citizens Act of 2010, which grants older Filipinos discounts on various goods and services, income tax exemptions, and access to long-term care and educational opportunities. Despite limited institutional options for older adults, familial support remains paramount due to cultural norms and the stigma associated with institutionalization.

Carandang et al. (2019) conducted a qualitative study exploring the perceptions of unmet needs and coping mechanisms among senior citizens residing in urban areas of the Philippines. Through focus group discussions and in-depth interviews with senior citizens, health providers, and local administrators, the study identified four major themes related to unmet needs: financial security, healthcare services, age-friendly environments, and family support. These findings illuminate the challenges faced by senior citizens in accessing essential services and underscore the scarcity of research on Filipino senior citizens' issues. Understanding how senior citizens cope with unmet needs is crucial for informing the development of interventions or support systems, aligning with our thesis's focus on enhancing senior citizen accessibility. Furthermore, the discussion of existing laws and policies related to senior citizens in the Philippines provides valuable context for our research and may inform potential recommendations for policy changes or improvements in senior citizen services (Carandang et al., 2019).

Inabangan et al. (2019) evaluate the implementation of Republic Act 9994 (RA 9994), which provides privileges to Filipino senior citizens. Findings reveal disparities in the dissemination and implementation of RA 9994 across establishments, highlighting challenges in accessibility and benefit utilization by

senior citizens. Cultural factors, including Filipino values and a "jackpot mentality" among senior citizens, were found to influence the law's implementation. The study utilizes the Provus Discrepancy Model (PDM) to assess policy implementation and recommends enhancing awareness and improving implementation mechanisms to address the unmet needs of senior citizens.

CHAPTER III

METHODOLOGY

In this chapter 3 of the study presents an elaborate explanation of the framework and procedures employed to tackle the objectives. Its main purpose is to ensure transparency by providing a clear understanding of the methods used for data collection, analysis, and interpretation. By reading this section, it comprehends the systematic approach followed in conducting the study, which aids in assessing its reliability and validity. Essentially, this chapter acts as a guide, outlining the steps taken to effectively investigate the research problem.

3.1 Methodological Framework

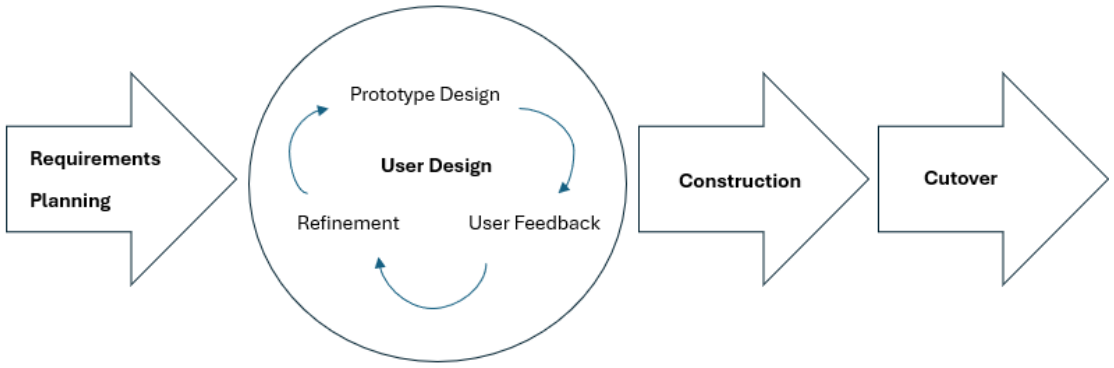

Figure 3.1 Methodological Diagram

Requirements Planning:

The initial stage involves collecting data to understand the challenges faced by senior citizens and pharmacy cashiers in using traditional booklet systems. A pre-survey is conducted to gather feedback on their experiences. Information about senior citizens is collected from the barangay hall, while pharmacy data can be obtained through Google Maps. This data collection will

inform the system's hardware, software, and database design, ensuring that it meets the needs of its users.

User Design (Prototype Stage):

1. **Prototype Design:** A prototype of the e-booklet system, including the website application and fingerprint scanner, is developed. The website will allow senior citizens to register and track their purchase history and personal information. Pharmacists will access the system to view registered senior citizens' data and transaction history.

2. **User Feedback:** The initial prototypes are shared with senior citizens and pharmacy cashiers to gather feedback on usability, accessibility, and design.

3. **Refinement:** Based on this feedback, iterative improvements are made to the system, ensuring user needs are addressed.

4. **Testing:** Testing is conducted after each refinement to ensure the prototype functions as expected.

Construction:

After the iterative user design phase, the fully developed system moves into construction. This phase includes:

- **Hardware Development:** Assembling and configuring the hardware components, including the fingerprint scanner, ensuring smooth integration with the software.

- **Software Development:** The web application is fully built using the finalized prototype design, incorporating features such as biometric authentication, user registration, discount computation, and transaction recording.

- **Database Configuration:** The system's database is finalized, ensuring secure storage of user data, purchase records, and transaction histories. The system also has local storage capabilities to operate offline.

Cutover (Final Deployment):

The final phase involves deploying the fully tested and constructed system. Key activities include:

- **Training:** A comprehensive training program for senior citizens and pharmacy cashiers ensures they can efficiently use the system.
- **Deployment:** The system is officially launched in pharmacies across Pasong Buaya 2, Imus, Cavite.
- **Ongoing Maintenance and Support:** Regular updates and support are provided to ensure optimal system performance and user satisfaction, addressing any issues that may arise after deployment.

3.2 Data Gathering Procedure

The process of gathering data involves a systematic approach designed to capture a comprehensive understanding of the accessibility challenges faced by senior citizens and to inform the development of an innovative solution. This process unfolds through several key steps, each meticulously crafted to ensure the collection of robust and insightful data:

- **Designing Research Instruments**

At the outset, the researchers meticulously design the research instruments—questionnaires protocols. These instruments are tailored to the specific research objectives, ensuring they effectively capture the breadth and depth of information necessary to inform the development of the electronic booklet system with biometrics. The instruments are designed to gather

quantitative data, providing a comprehensive understanding of user needs and system requirements.

- **Participant Selection**

A purposive sampling approach will be employed, focusing on selecting senior citizens and pharmacy cashiers to ensure a diverse representation of perspectives. By intentionally including individuals with varied backgrounds and experiences, the study aims to gain comprehensive insights into the accessibility challenges faced by senior citizens and the effectiveness of the proposed electronic booklet system in pharmacy settings. This method enhances the validity and depth of the data collected, facilitating a thorough understanding of the issues and guiding targeted interventions to enhance senior citizen accessibility.

- **Informed Consent**

Recruited respondents are provided with detailed information about the purpose of the study, the procedures involved, and the expected duration of their participation. They are given the opportunity to ask questions and express any concerns before voluntarily agreeing to participate by signing an informed consent form. This process ensures ethical standards of voluntary participation and confidentiality of the participants.

- **Pre - Survey**

Based on the pre-survey results from both senior citizens and pharmacies, it is evident that managing traditional booklets presents significant challenges. Both groups face difficulties with updating the booklet and the risk of booklet loss. These issues highlight the need for an efficient solution.

Respondents provided valuable suggestions that offer insights into the overall study, helping to shape a system that aligns with the preferences of both senior citizens and pharmacies. They emphasized the importance of accuracy, regular updates, and the need for the system to be user-friendly and secure.

The feedback from the respondents regarding the e-booklet system for managing senior citizen records in pharmacies highlights the need for more information tailored to the needs of senior citizens. Suggestions include incorporating details on the benefits available to senior citizens and utilizing social media for updates. respondents also emphasized the importance of user-friendly features in the e-booklet system to ensure ease of use. Overall, the feedback underscores the potential of the e-booklet system to streamline transactions for senior citizens, emphasizing the significance of accuracy, regular updates, data privacy, and considering location-specific factors for the successful implementation of the system.

- **Data Collection**

With research instruments in hand, data collection commences. Pre-survey questionnaires were handed out to senior citizens and pharmacy cashiers to gain insights about the challenges of traditional senior citizen booklets and the possibility of a digitized senior citizen booklet. Questionnaires will also be administered to gather quantitative data after the creation of the e-booklet system, providing statistical insights into the prevalence and magnitude of accessibility challenges.

- **Data Analysis**

The collected data undergoes rigorous analysis, with quantitative data subjected to statistical methods to uncover patterns, trends, and correlations. This multifaceted analysis ensures a holistic understanding of the accessibility landscape, laying the foundation for informed decision-making in the development of the electronic booklet system using biometrics.

By adhering to this systematic process, the research endeavors to uncover actionable insights that will drive the development of an electronic booklet system using biometrics poised to enhance accessibility for senior citizens.

3.3 Research Design

The study adopts an experimental research design. Experimental research is an approach that involves manipulating one or more independent variables and measuring their effect on one or more dependent variables.

The study begins with a needs assessment survey to gather data on senior citizens' current access to information regarding their benefits and discounts. The survey will be distributed to a representative sample of senior citizens to identify the specific challenges they face in accessing this information.

Based on the survey results, an e-booklet system will be developed to provide senior citizens with up-to-date information on their benefits and discounts. The system will incorporate features such as large text, high-contrast colors, and voice-over functionality to enhance accessibility.

To evaluate the effectiveness of the e-booklet system, an experiment will be conducted. Senior citizens will be randomly assigned to either a control group or an experimental group. The control group will use a traditional method of accessing information, while the experimental group will use the e-booklet system. The performance and feedback of both groups will be collected through structured questionnaires and analyzed using statistical methods. The experimental design will allow the researchers to isolate the effect of the e-booklet system on the accessibility and usability of information for senior citizens. The results will be used to assess the effectiveness of the system and refine it to better meet the needs of senior citizens.

By adopting an experimental research design, the study aims to provide causal evidence on the impact of the e-booklet system on senior citizen access to information regarding their benefits and discounts.

3.4 Research Instruments

In the methodology section, the discussion on research instruments would encompass the utilization of questionnaires. These structured sets of questions serve as a vital tool for gathering quantitative data from a large number of respondents efficiently. In the context of this thesis, questionnaires may be designed to assess senior citizens' preferences, challenges, and needs regarding accessibility issues. The questionnaire design should be clear, concise, and tailored to capture relevant information essential for developing the electronic booklet system using biometrics finger scanner.

Before the actual data gathering for the respondents, a pilot testing would be conducted to ensure the comprehensibility of the questions. The researchers made a pre-survey that tackled the challenges faced by senior citizens and pharmacy cashiers with traditional booklets and what both participants (senior citizens and pharmacy cashiers) want to see in the user interface to make it an effective digital booklet. Questions covered their preferences, how to make their daily lives easier, and whether the system would help them in the long run.

The pre-survey aimed to gather insights into the specific needs and expectations of senior citizens and pharmacy cashiers regarding the proposed electronic booklet system. By understanding their preferences, challenges, and desired features, the researchers could design a user interface that is tailored to their needs and enhances the overall accessibility and usability of the system.

3.5 Testing Methodology

The testing methodology encompasses three key aspects: functionality, accuracy, and user-friendliness, each crucial for ensuring the efficacy and accessibility of the system for senior citizens.

- **Functionality Testing:** This aspect involves evaluating the system's ability to perform its intended functions effectively. Specifically, testing would focus on verifying that the electronic booklet system operates as expected, allowing senior citizens to input, access, and manage their information seamlessly. Functionality testing ensures that all features, such as viewing medical records or updating personal information, function correctly without errors or glitches, Testing the system's ability to function seamlessly in offline mode, allowing senior citizens to register, access, and manage their information

even when WiFi connectivity is unavailable. This includes verifying that essential features, such as registration and updating personal information, remain accessible without internet access, thereby enhancing the overall usability and reliability of the system.

- **Accuracy Testing:** Accuracy testing is essential to ensure the precision and reliability of the biometric authentication feature integrated into the electronic booklet system. This involves validating the accuracy of fingerprint scanning and authentication processes, ensuring that senior citizens can reliably access their accounts without encountering false positives or negatives. Accurate biometric authentication is paramount for maintaining the security and integrity of the system, safeguarding sensitive user information from unauthorized access. Evaluating the accuracy and effectiveness of the camera-based registration process, which allows users to register by capturing their images. This involves testing the system's ability to capture and process images accurately, ensuring a smooth and accessible registration experience for senior citizens.

- **User-Friendliness Testing:** user-friendliness testing is critical for assessing the ease of use and accessibility of the electronic booklet system. This involves gathering feedback from senior users through usability testing sessions to evaluate their experience with navigating the interface, inputting information, and accessing desired features. By identifying and addressing any usability challenges or barriers, such as small font sizes or complex navigation menus, user-friendliness testing ensures that the system is intuitive and accommodating for senior citizens, promoting inclusivity and enhancing overall user satisfaction.

Assessing the system's user-friendliness in offline mode, including the clarity of instructions and ease of navigation when accessing features without internet connectivity. This ensures that senior citizens can interact with the system comfortably even in situations where WiFi is unavailable.

In summary, the testing methodology encompasses functionality, accuracy, and user-friendliness testing, each essential for ensuring the effectiveness, reliability, and accessibility of the system for its intended users.

3.6 Proposed System Process and Design

The proposed system comprises several essential components designed to facilitate efficient operation and seamless user experience. This ensures that only authorized individuals can access the system's functionalities, enhancing overall security.

- **Database Management component:** plays a pivotal role in storing, organizing, and managing vast amounts of data critical to the system's operation. This includes personal information, medication records, and transaction details of the senior citizens. By providing a robust and reliable database infrastructure, this component ensures data integrity and accessibility, enabling efficient retrieval and manipulation of information when needed.

- **Discount Calculation and Verification component:** responsible for accurately calculating discounts applicable to senior citizens during transactions and verifying their eligibility.

- The component interfaces with the database to access relevant data on senior citizen discounts and eligibility criteria.
- When a senior citizen makes a purchase, the component calculates the applicable discount based on the type of medicine, price, and the senior citizen's eligibility status.
- Once the discount is calculated and eligibility is verified, the component applies the discount to the transaction total, ensuring transparency and accuracy

By interfacing with the database, this component accesses relevant data to verify discounts, ensuring transparency and accuracy in discount calculations. This enhances the system's functionality and helps streamline the transaction process for both senior citizens and pharmacy cashiers.

- **User Interface component:** serves as the primary means of interaction between users and the system. Tailored interfaces are provided for different user groups, such as senior citizens and pharmacy cashiers, to ensure usability and accessibility. Through intuitive design and user-friendly features, this component enhances the overall user experience, enabling users to navigate the system effortlessly and access desired functionalities with ease.
  - For senior citizens, the interface includes features such as registration with a One-Time Password (OTP) for security, login, transaction management, profile settings, and access to system reports.
  - For pharmacy staff, the interface offers admin sign-in, login capabilities, access to senior citizen data, an interactive dashboard, a shopping cart for managing discounted medicine

purchases, and a confirmation page indicating the completion of an order. These features will be fully discussed in the proposed interface section, ensuring that the design caters to the specific needs and preferences of both user groups for a seamless and user-friendly experience

3.7 Block Diagram

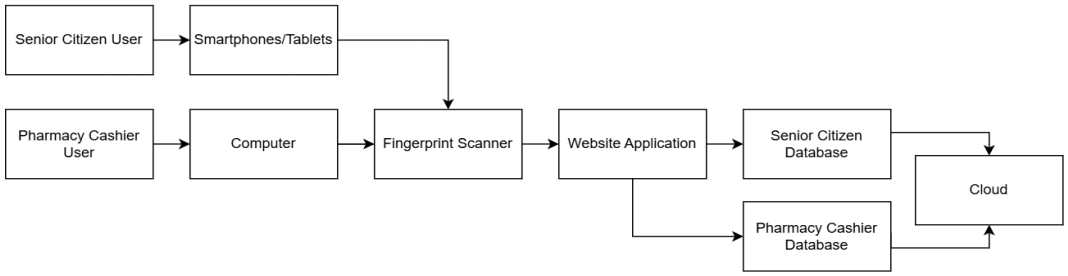

Figure 3.2 Block Diagram

There will be different processes that will occur for fingerprint identification systems for senior citizens. The first process involves creation of accounts of senior citizens and pharmacy cashiers. The users can create their own accounts. In the creation process of a senior citizen, they will enter their information on the website by using a smartphone/tablet with touchscreen interface and camera. They will also have one-time password authentication for security purposes. At the same time, their fingerprint pattern will be obtained by the website. They will also upload their profile image for their account. Their information will be saved in the database for senior citizens.

As for the creation of accounts of pharmacy cashiers, their data would be stored in the database for pharmacy cashiers. However, there is only one account per pharmacy location. All the information would be available on the

website. As for the next process, it is for the transaction between senior citizens and pharmacy cashiers. In this part, the fingerprint of the senior citizen would be scanned and checked. The fingerprint would be scanned through the fingerprint scanner. If there is a match in the database, the transaction can proceed. The transaction details would be stored in the database which can be accessed in the website through logging in on their own accounts. However, if there is no match in the database of senior citizens, the transaction cannot proceed. The website will also be responsible for fingerprint matching in the database of senior citizens.

3.8 Flowchart

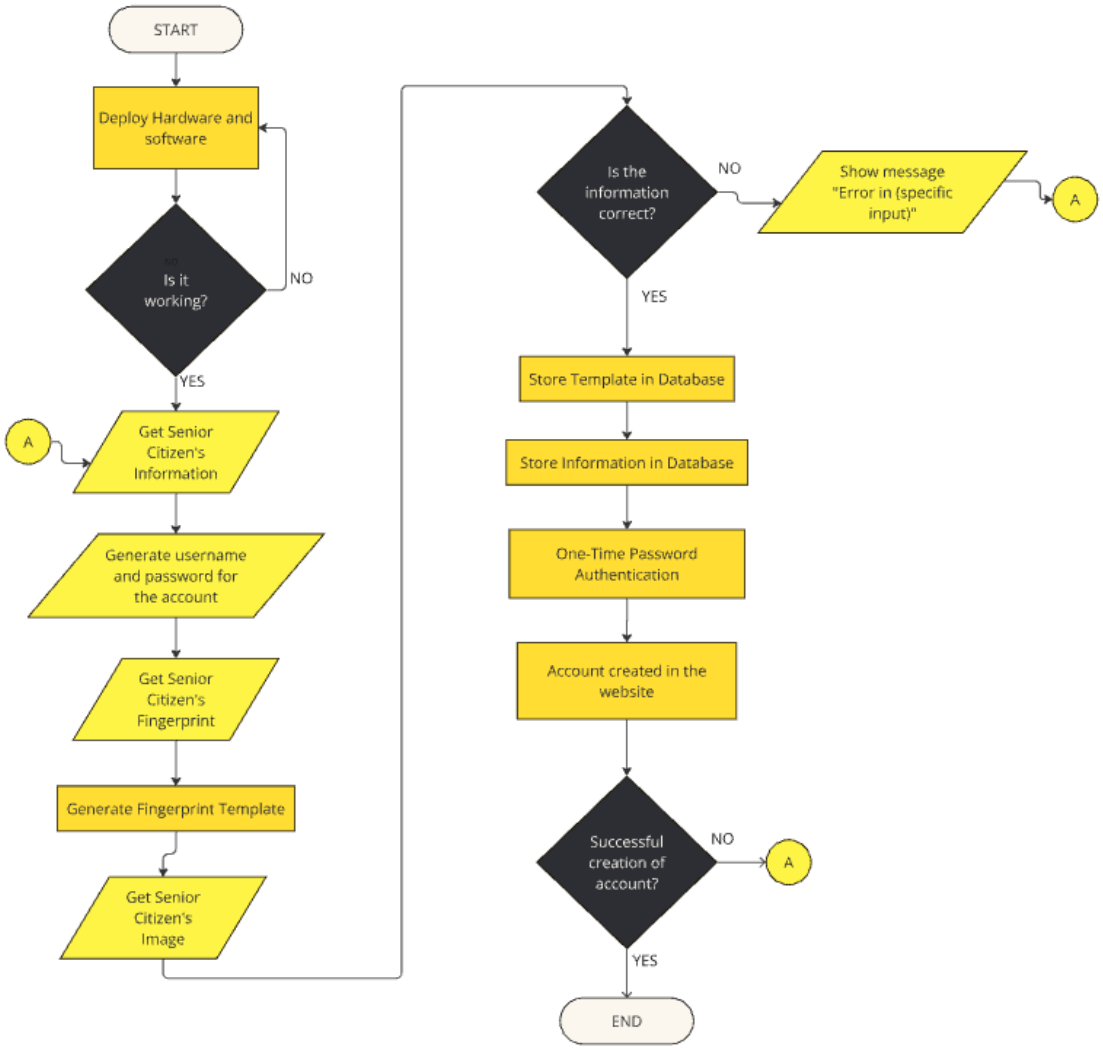

Figure 3.3 Flowchart for Sign Up Account of Senior Citizens

In this flowchart, the senior citizens will create their own accounts. However, they can be assisted by their family members or caretakers if they have difficulties in using technology. The flowchart will first process both hardware and software components, then prompt whether both are functioning properly. If the answer is no, it will loop back to the process of checking both. Then, the program will get the basic information of the senior citizen. Then, the username and password would be made. The program will ask for the senior

citizen's fingerprint. The software would create a fingerprint template. The program will ask the senior citizen's profile picture. The program will perform a One-Time Password Authentication for security purposes. Then, the program would ask if the information entered is accurate. If the answer is no, an error message would occur which will cause the program to ask again to enter the information of a senior citizen. If the answer is yes, the template and information of the senior citizen would be stored in the database. The account will be created, and the program will ask if the creation is successful or not. If the answer is yes, the program ends. If the answer is no, the program will go back to asking the senior citizen's information.

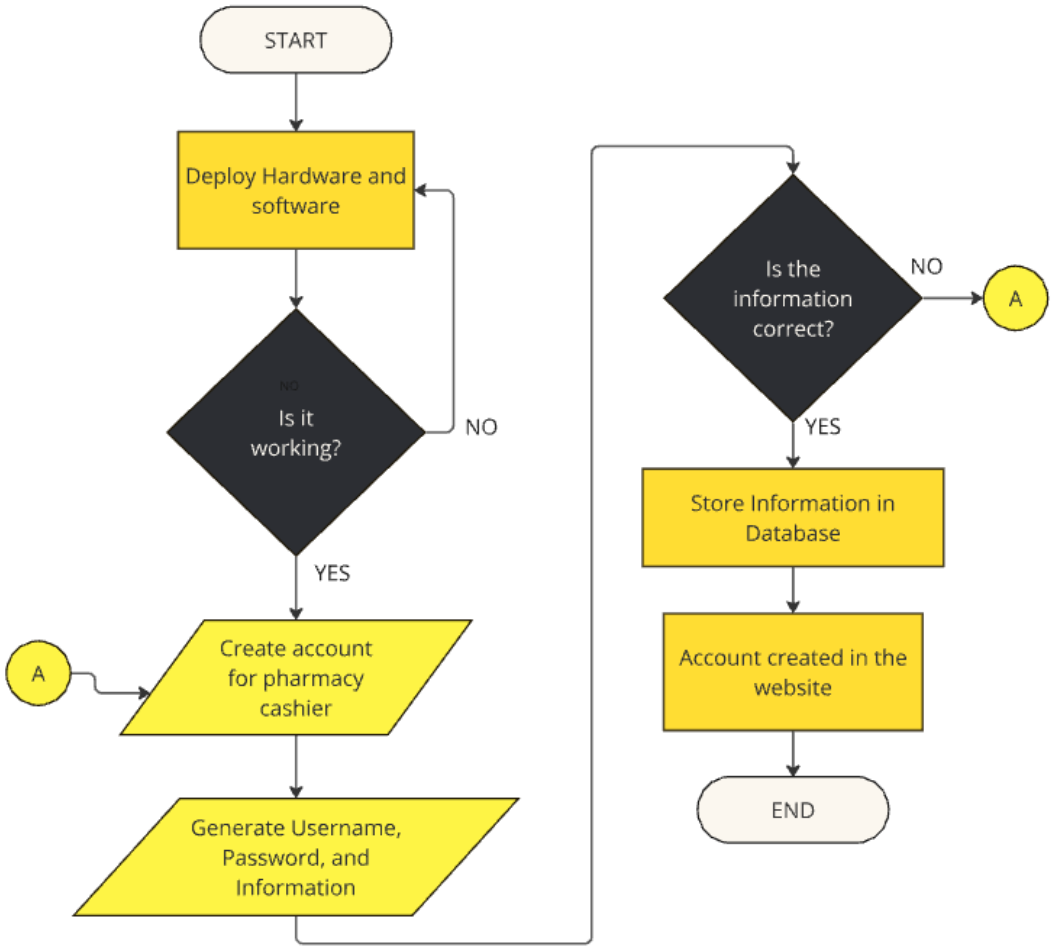

Figure 3.4 Flowchart for Creation of Pharmacy Cashier Account

In this flowchart, the program is going to ask the pharmacy cashier to make an account which will be used by the rest of the cashiers in the specific pharmacy location. The flowchart will first process both hardware and software components, then prompt whether both are functioning properly. If the answer is no, it will loop back to the process of checking both. The cashier will enter important information such as the store location and store name. The program will ask if the information is correct. If the answer is no, the program will ask the cashier to create an account and enter the correct information. If the answer is yes, the program will store the information on the database of pharmacy cashiers. The account would then be created, and the program would conclude.

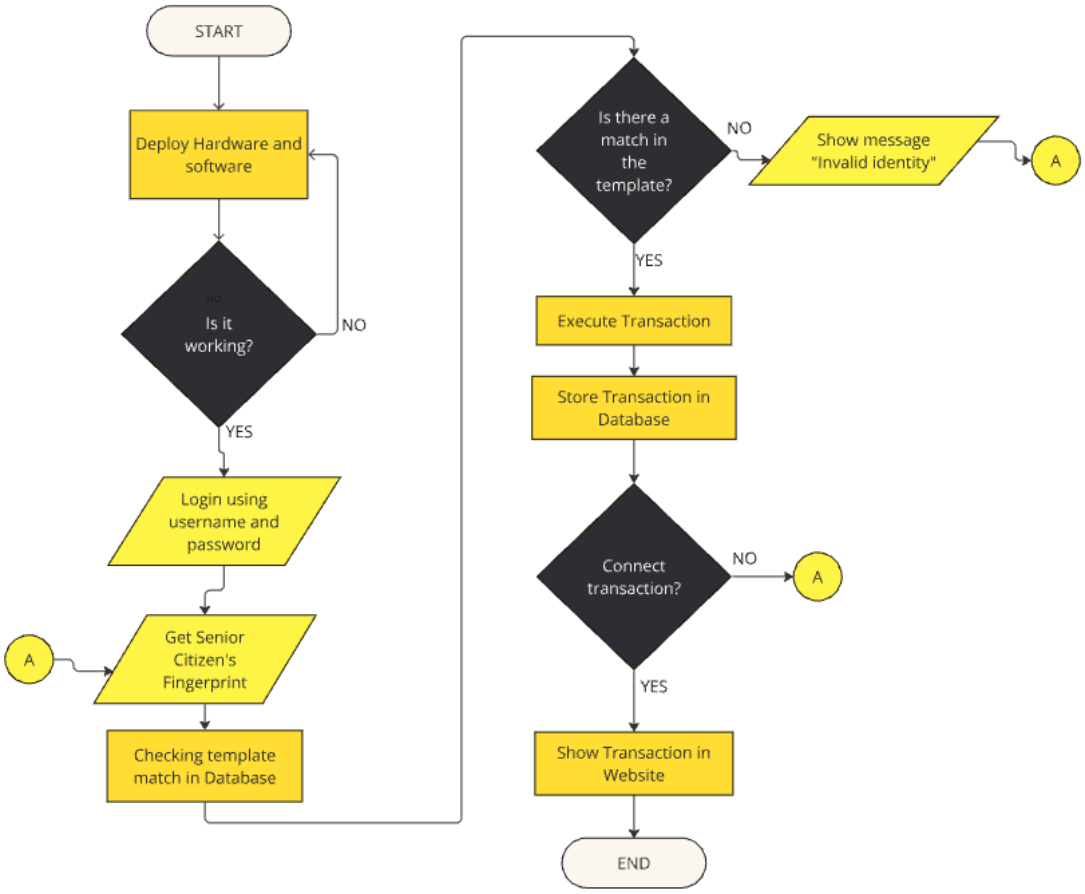

Figure 3.5 Flowchart for Transactions of Pharmacy Cashier

In this flowchart, the transaction between the pharmacy cashier and senior citizen would take place. The flowchart will first process both hardware and software components, then prompt whether both are functioning properly. If the answer is no, it will loop back to the process of checking both. The pharmacy cashier would login using the pharmacy's username and password. Then, the cashier would ask the senior citizen to place their fingerprint on the fingerprint scanner. The database would check if the fingerprint has a match on the fingerprint templates. The program would ask if there is a match, if the answer is no, the pharmacy cashier would ask again for the fingerprint of the

senior citizen. If the answer is yes, the cashier would execute the transaction. The transaction details would be stored in the database of the senior citizen. If the transaction is successfully stored, it will appear on the website and the program will conclude. If the transaction is not successful, the program would go to A.

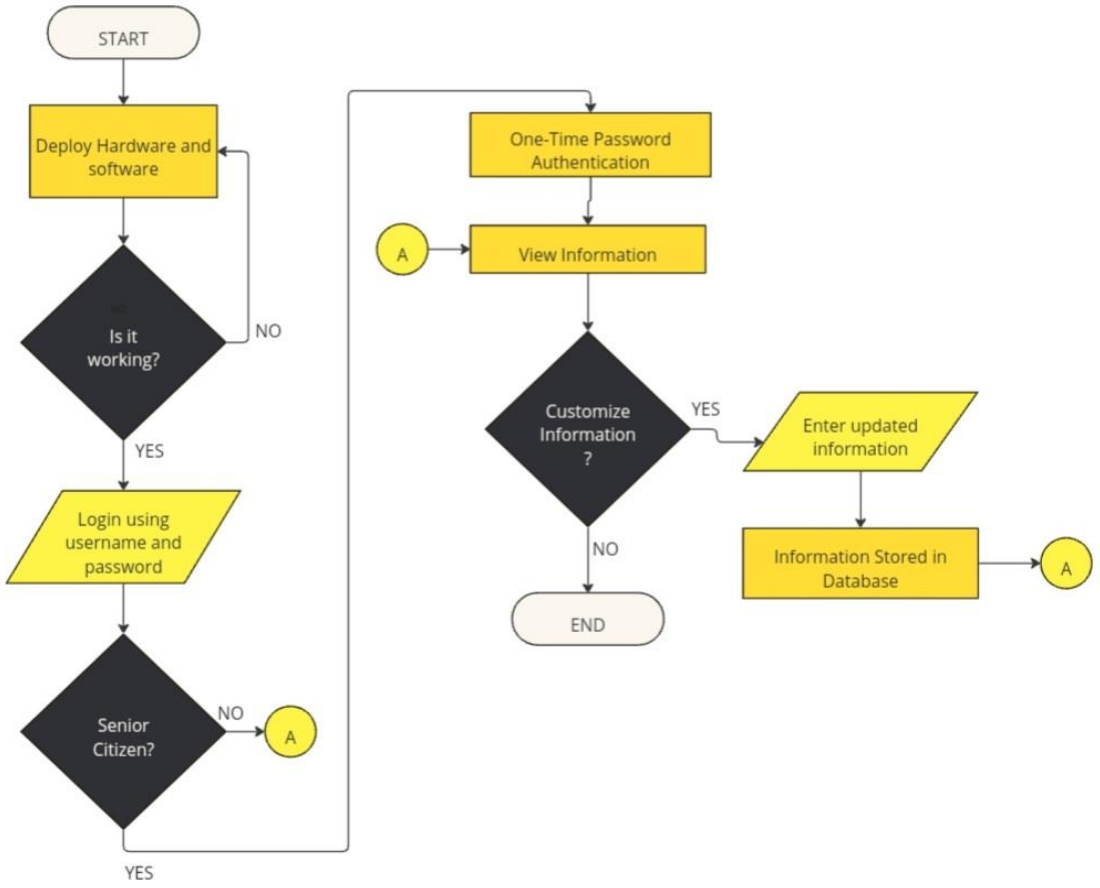

Figure 3.6 Flowchart for Navigating Senior Citizen and Pharmacy Cashier Accounts

The flowchart will first process both hardware and software components, then prompt whether both are functioning properly. If the answer is no, it will loop back to the process of checking both. The general navigation starts with

the login process using username and password. If the user is a senior citizen, there will be a One-Time Password Authentication process. If not, the program will go to A. The user can view information available on each account. The information available on the senior citizen accounts are the purchase transaction history and is named as the "systems report page" and profile. They can customize the profile information, and the customized information will be saved in the database and will be shown on the website. However, they can only view their purchase transaction history and not edit them. As for the information available on the pharmacy cashiers, their information is available and the purchase transaction history of senior citizens that ordered from their pharmacy. They can also see the basic information of senior citizens that registered their account on the website.

3.9 System Architecture

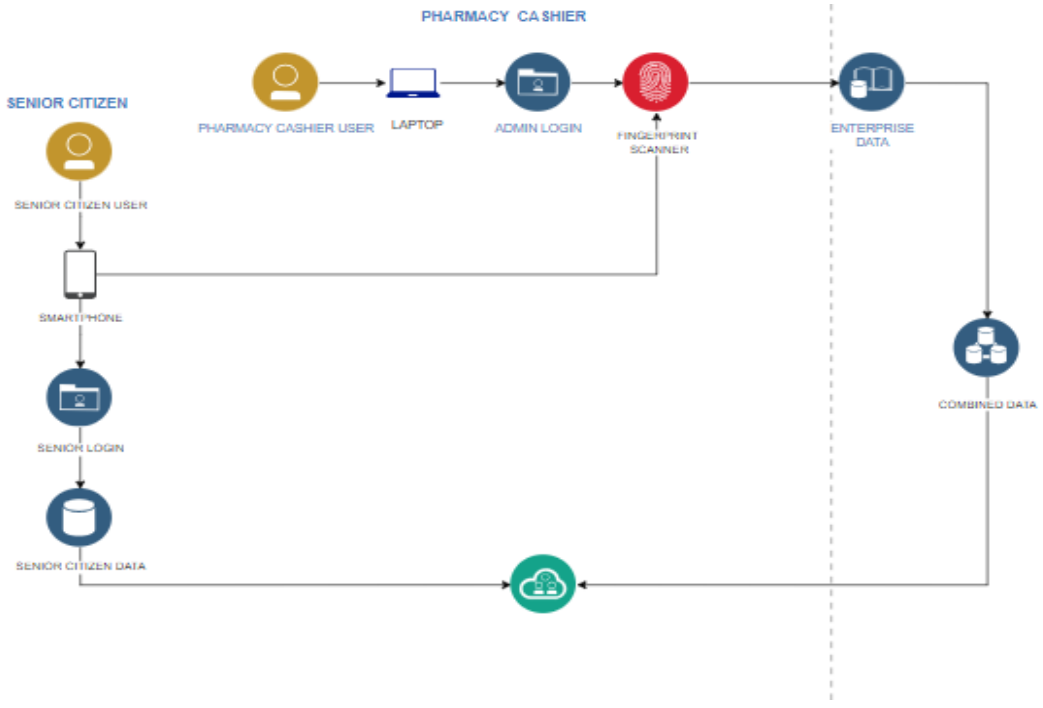

Figure 3.7 System Architecture Diagram

Both senior citizens and pharmacy cashiers interact with the system through the user interface, accessing features like registration, and discount calculation. The interface communicates with the database management system to retrieve and retain user data and discount information. Utilizing this data, the discount calculation and verification system accurately calculates and discounts during transactions. Additionally, the system incorporates a shopping cart for pharmacy cashiers to add purchased and discounted medicines to the senior's transaction, an admin dashboard for managing operations, and inbox and transaction features for seniors to stay informed about their purchases and transactions securely. The system also integrates a phone camera-based registration process for senior citizens, enhancing security and ease of registration.

3.10 Proposed System Components

The user registration and authentication system forms a foundational pillar of the proposed platform, enabling seamless registration for senior citizens and pharmacy cashiers, with robust authentication mechanisms ensuring secure access. This streamlined process enhances overall security and accessibility, empowering authorized users to confidently access features. Additionally, it incorporates shopping cart functionality, an admin dashboard for retailers, and inbox and transaction management for seniors.

- **Database management system:** it plays a pivotal role in storing and managing crucial data, including personal information, medicine records, and discount transactions. With its robust architecture and efficient data

management capabilities, this system serves as the backbone of the platform, enabling seamless access to critical information while ensuring data integrity and security.

- **Discount calculation and verification system:** responsible for accurately calculating discounts and verifying them during transactions. This system interacts seamlessly with the database to access relevant data for discount verification, ensuring transparency and accuracy in discount calculations while mitigating the risk of errors or discrepancies.
- **User interface system for senior citizens and pharmacy cashiers:** The user interface system for senior citizens and pharmacy cashiers serves as the primary interaction point, prioritizing intuitive design to enhance usability. The system empowers users to navigate effortlessly, ensuring efficient access to essential services and features while prioritizing accessibility and user experience.

Collectively, these integrated systems form a sturdy and comprehensive platform designed to meet the diverse needs of senior citizens and pharmacy cashiers, while delivering a seamless and user-friendly experience across all interactions with the system.

3.11 Hardware Components

Hardware components play a vital role in the functionality and efficiency of any system. In the context of the study, these components encompass a diverse array of tools and devices essential for its operation:

Figure 3.8 Finger scanner

Fingerprint Scanner: The hardware component of the system, the fingerprint scanner, will be utilized for biometric authentication during user registration and authentication processes. This scanner will capture and store unique fingerprint patterns of senior citizens, ensuring secure access to the system and enhancing authentication mechanisms. Prior to deployment, thorough testing will be implemented to validate the functionality and integration of the fingerprint scanner with all other system components.

Figure 3.9 Technological Devices

Technological Devices: There will also be the use of Technological devices such as computers to be used for the development of the web application. It needs to be able to run the application and connect with the other hardware components. Other possible technological devices are laptops, tablets, and phones.

3.12 Software Components

The utilization of various software components plays a crucial role in ensuring the functionality, security, and accessibility of the system. The following are used:

- **Programming Languages:** Various programming languages are to be employed in the development of the system. HTML and CSS will be utilized for programming the backend, ensuring a user-friendly interface and intuitive design. Additionally, the use of Figma, a collaborative interface design tool, will facilitate the creation of visually appealing and accessible user experiences tailored to the specific needs of senior citizens.
- **Database Management:** MySQL will serve as the primary database management system for the storage and retrieval of data and information within the electronic booklet system. Its reliability and scalability make it an ideal choice for efficiently managing user data, electronic booklets, and authentication records. Through the integration of MySQL, the system ensures robust storage capabilities and seamless access to critical resources, enhancing the overall performance and reliability of the system.

- **MySQL Database Server:** The backend database management system where the researchers would store data. The researchers will set up and manage the MySQL database to store user information and transaction records securely.
- **Python Programming Language:** The researchers will use this as the primary tool for developing the software logic of the Electronic Booklet system. Here the researchers would write Python scripts to interact with the fingerprint sensor module, communicate with the MySQL database, and implement information tracking functionalities.
- **PyMySQL Library for Python:** A Python library that enables connectivity between the Python scripts and MySQL database. The researchers would use PyMySQL to execute SQL queries, retrieve and store data, and manage database operations seamlessly.

3.13 Software Process

Figure 3.10 Senior Citizen Sign Up Process

In the sign up process for a senior citizen, the senior citizen will enter his/her information in the website including the profile image and obtain his/her fingerprint. The information and fingerprint would be saved in the database for senior citizens. Then, the account will be created on the website. The senior citizen has their own username and password. The account is for if he/she wants to check his/her transaction details.

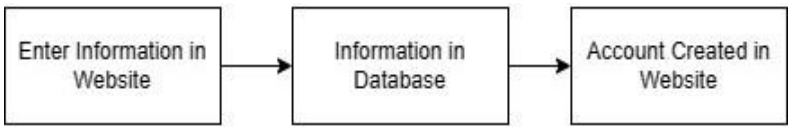

Figure 3.11 Pharmacy Cashier Sign Up Process

In the sign-up process for a pharmacy cashier user, the cashier will enter information about the store location and name. The username and password would also be entered. The information would be stored in the database for pharmacy cashiers. Then, the account would be created on the website.

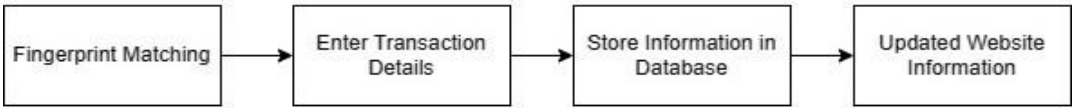

Figure 3.12 Transaction between Senior Citizen and Pharmacy Cashier Process

In the transaction process, assuming that the cashier has already logged in on the website, he/she will ask for the fingerprint of the senior citizen. The website will check if the fingerprint exists in the database. If it does, the transaction will proceed. If not, the transaction cannot continue. The cashier will then enter transaction details, and the details would be stored in the database for senior citizens. The updated database would appear on the website.

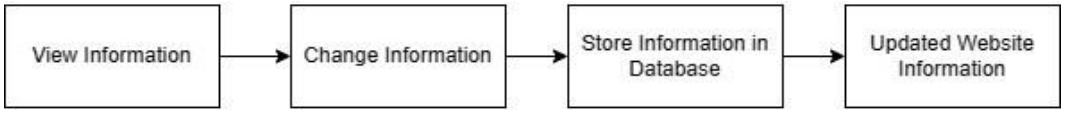

Figure 3.13: Navigation Process of Senior Citizen and Pharmacy Cashier Accounts

Each account can alter certain information in their respective accounts. For the senior citizens, he/she can change profile information. However, he/she can only view his/her purchase transaction records and not edit them. As for the pharmacy cashiers, they can also change profile information. For pharmacy cashiers, they can view the purchase transaction records of senior citizens that

ordered in their pharmacy and as well as the basic information of the senior citizens that registered their account on the website.

3.14 Proposed Database Design

In designing the database for the proposed system, careful consideration is given to its structure and components to ensure efficient storage, retrieval, and management of crucial information. Central to this design are tables dedicated to user data authentication and discount transactions, essential for maintaining the integrity and security of user accounts and facilitating seamless transaction processing. Additionally, the inclusion of a comprehensive product inventory table, intricately linked with discount transactions, enhances the system's functionality by providing time access to product information and pricing. Through meticulous database design, the system aims to optimize performance, enhance data accuracy, and streamline the user experience for both senior citizens and retail pharmacy staff.

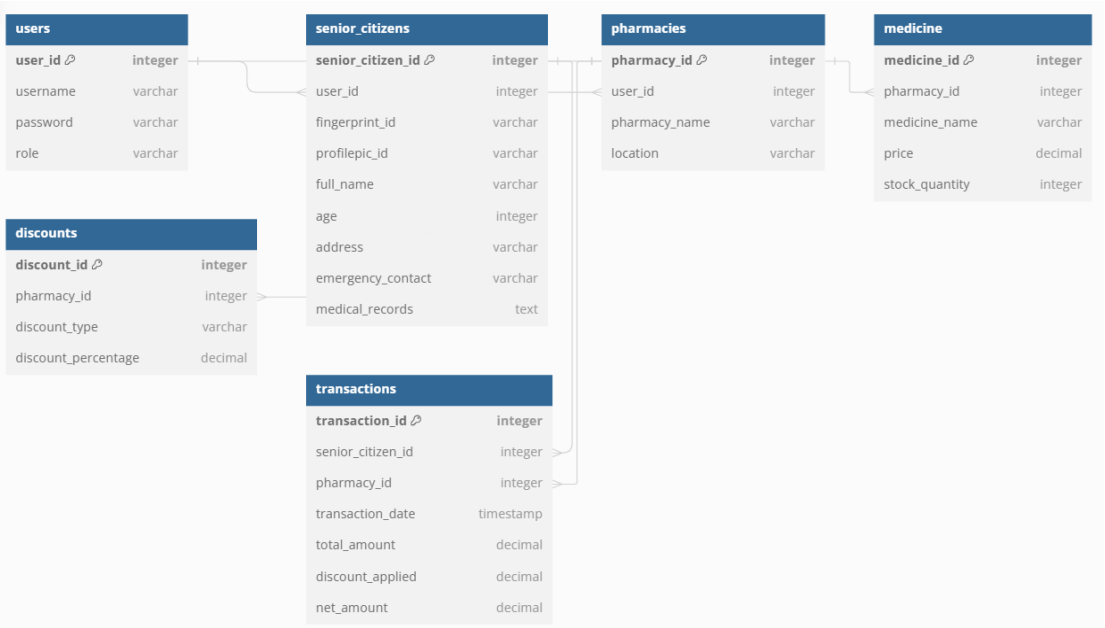

Figure 3.14 Database Design

- **users Table:** This table stores information about all users of the system, including senior citizens and pharmacy cashiers. This will be the primary key and the other tables will be the foreign keys.
- **senior_citizens Table:** This table contains details specific to senior citizens who are registered users of the system. Each senior citizen entry is associated with a user from the users table.
- **pharmacies Table:** This table holds information about different pharmacies registered in the system. Each pharmacy entry is associated with a user from the users table.
- **discounts Table:** This table stores discount information offered by pharmacies. Each discount entry is associated with a pharmacy from the pharmacies table.
- **transactions Table:** This table records details of transactions made by senior citizens at pharmacies. Each transaction entry is associated with a

senior citizen from the senior_citizens table and with a pharmacy from the pharmacies table.

3.15 Proposed Hardware Design

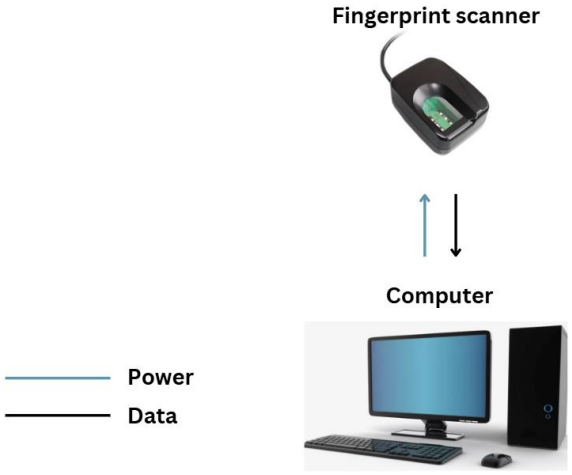

Figure 3.15 Hardware Design

In the hardware design, the fingerprint scanner is connected to the computer. The fingerprint scanner will transfer the fingerprint pattern to the computer. The data transferred to the computer will be received by the website and database. The website will then either do fingerprint matching or add the fingerprint to the senior citizen database depending on the option that the pharmacy cashier chose. For the fingerprint matching, the website will check if the fingerprint matches one of the fingerprint templates in the database of the senior citizens. If the fingerprint has a match, the purchase transaction will continue. The transaction will be saved on the database once the details are entered on the website.

3.16 Proposed User Interface

The user interface is meticulously crafted to prioritize ease of use and accessibility for senior citizens. Large and legible fonts ensure that text is easily readable, catering to potential visual impairments that may accompany aging. Intuitive navigation elements are strategically implemented to guide users seamlessly through the system, reducing any potential confusion or frustration. The application is aptly named Together We Care because it emphasizes a collaborative approach to addressing the challenges faced by seniors and pharmacy cashiers. This digital solution not only aligns with recent legislative developments but also aims to create a more user-friendly and inclusive environment. By streamlining access to discounts and services, Together We Care directly addresses the limitations of traditional booklets—such as physical accessibility issues and delays in information updates—ultimately enhancing the overall experience and well-being of senior citizens.

The user interface will also feature:

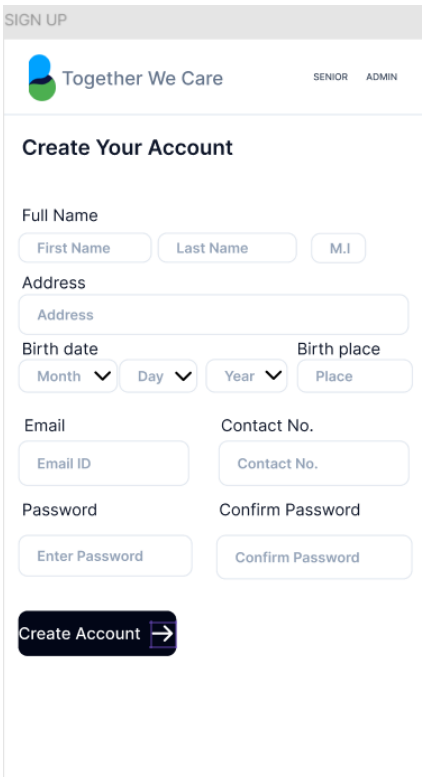

Figure 3.16 REGISTRATION

Registration page:

The registration page offers a user-friendly interface tailored for senior citizens. It allows them to input personal information like Full name, email address, address, birth date, birthplace, contact and password facilitated by large fonts and clear prompts. Integration of a biometric fingerprint scanner ensures secure authentication, enhancing data protection. A simple submit button finalizes registration, ensuring ease of use and accessibility throughout the process.

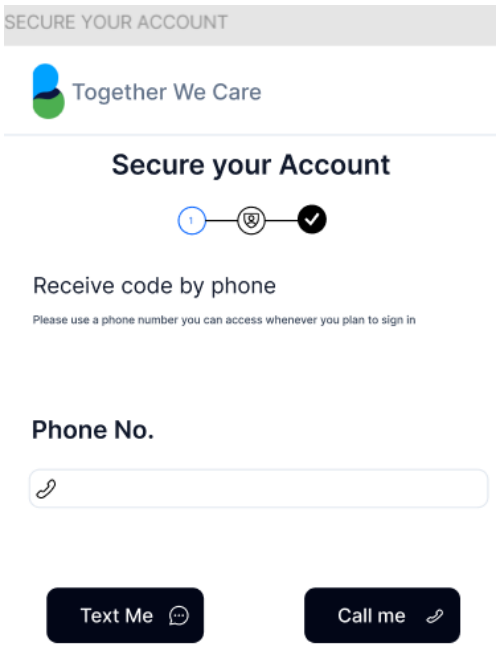

Figure 3.17 Securing the Account

Securing the Account:

In securing the account, the senior citizens are prompted to enter their phone number on the securing the account page. After entering the phone number, they are given the option to choose how they would like to receive their authentication code or One-Time Password (OTP) for secure account verification. They can opt to receive the code either through text message or via a phone call.

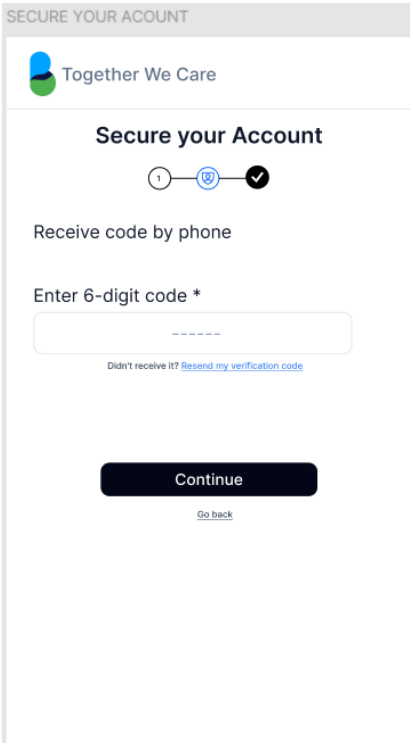

Figure 3.18 6-digit Code

Entering the 6-digit Code Page:

Once the phone number is entered, a 6-digit code is sent to the user's number via text message or call after a few seconds. The user then inputs this code for double authentication, also known as a one-time password (OTP). This process ensures an additional layer of security, enhancing data protection.

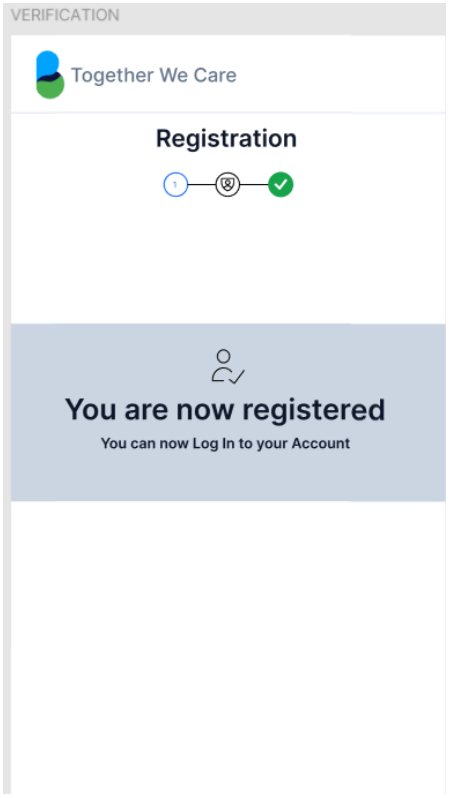

Figure 3.19 Already Registered

Already Registered:

Once registered, senior citizens can now log in again to their account. This registration system is part of developing an E-booklet system for senior citizen access, aiming to provide a seamless and secure way for seniors to manage their benefits. This includes features such as discounted medicine purchases, personal information management, and access to transaction history. The system enhances accessibility and convenience, ensuring that senior citizens can easily and securely access their benefits.

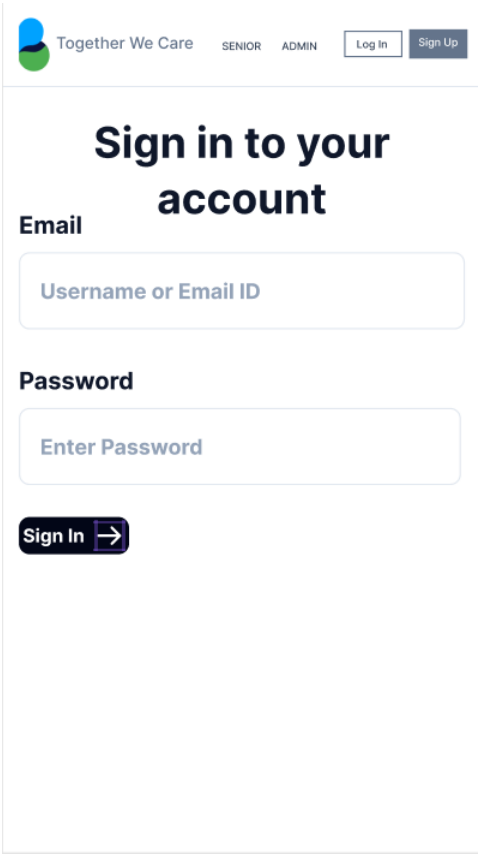

Figure 3.20 LOG IN

User Login Page:

The user login page provides a straightforward interface for accessing the system's resources. Registered users can securely log in using traditional username and password fields, with clear prompts and large fonts ensuring accessibility. A simple login button enables seamless access to the system, emphasizing ease of use and security for senior citizens navigating the electronic booklet system.

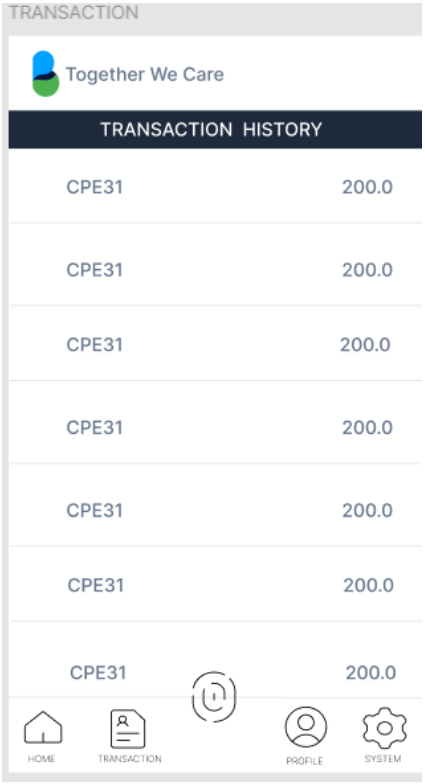

Figure 3.21 TRANSACTION

Transaction page:

The transaction page is pivotal in enhancing accessibility and affordability for senior citizens by facilitating purchases, including medications, with discounted rates tailored for them. Additionally, the integration of a reporting system allows for comprehensive tracking and analysis of transaction data, enabling the system to identify trends, monitor user behavior, and optimize discount offerings. This feature not only promotes affordability but also fosters a sense of support and care for the senior citizen community, underscoring the system's commitment to their well-being and accessibility of electronic resources, ultimately enhancing their overall experience and engagement.

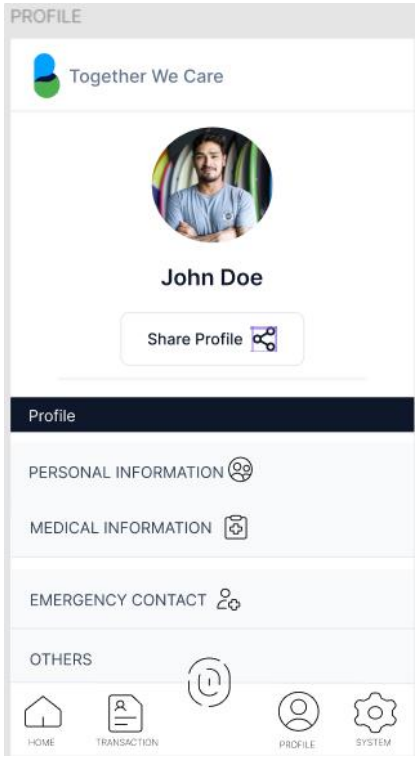

Figure 3.22 PROFILE

Profile Settings:

The profile settings page is designed to empower senior citizens with control over their personal information and account security. This interface allows users to effortlessly view and edit essential details such as personal information, medical records, and emergency contacts, ensuring accuracy and accessibility. Additionally, the page includes a change password functionality, enhancing account security and enabling users to safeguard their personal information with ease.

Furthermore, the profile settings page features an Others button, which provides users with the opportunity to give feedback on the website. This feedback option ensures that senior citizens can voice their experiences and suggestions, helping to continuously improve the platform. By prioritizing user control, security, and feedback, the system underscores its commitment to empowering senior citizens with accessible and secure electronic resources.

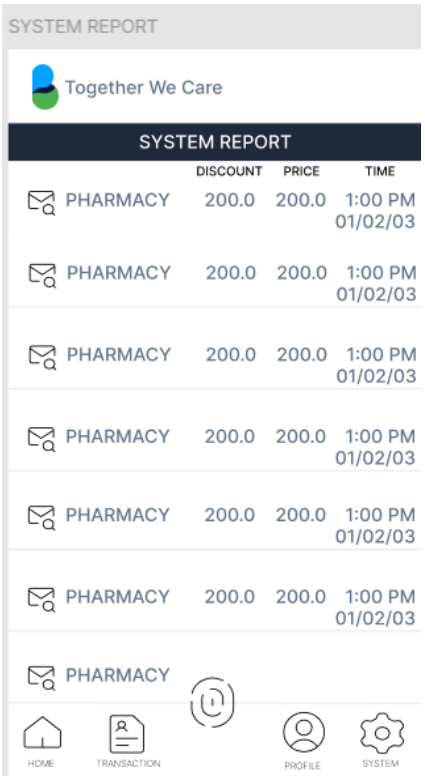

Figure 3.23 System Report

System Report page:

The system report includes a Transaction History feature that provides detailed records of purchases made by senior citizens. This feature displays information such as the pharmacy where the medicine was bought, the time of the transaction, details of any discounts applied, and the original price. By offering transparency regarding discounts, purchase locations, and transaction times, this feature enhances accessibility and empowers senior citizens to track their medication expenses efficiently. Additionally, it ensures accuracy in billing and reflects the system's commitment to providing a secure and user-friendly platform tailored to the needs of senior citizens.

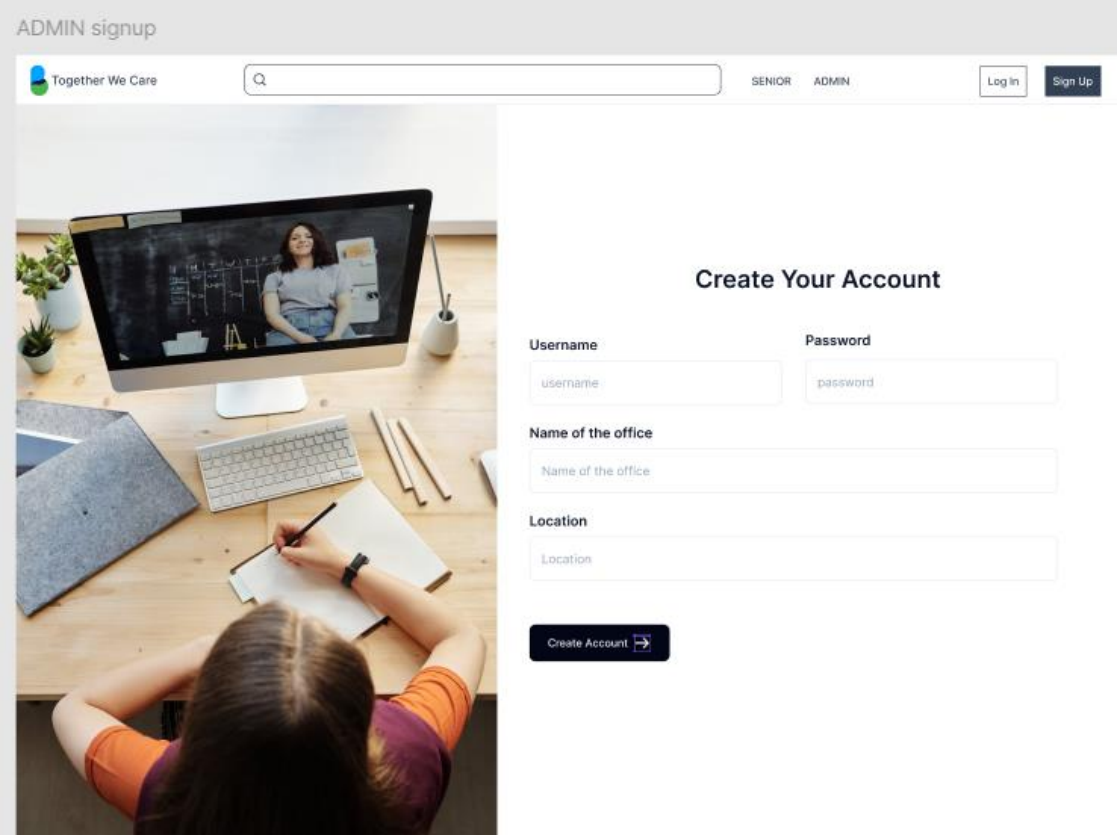

Figure 3.24: Admin Signup

Admin Sign up:

The admin signup process includes entering key details such as username, password, office name, and location. This registration enables system administrators to access both the electronic booklet system and the admin dashboard, empowering them in managing senior citizen affairs. By integrating admin signup functionalities, the system streamlines coordination between administrators and the electronic booklet platform, thus improving accessibility and support for senior citizens' needs.

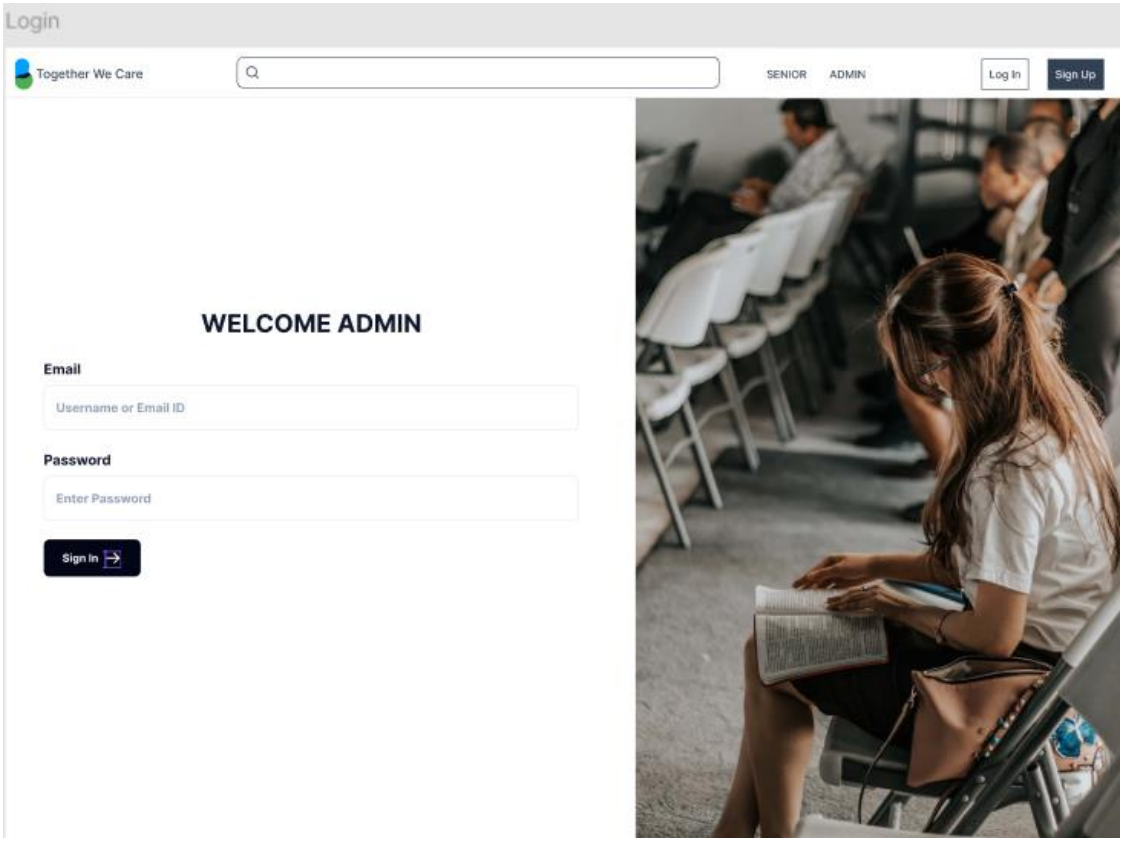

Figure 3.25 ADMIN LOGIN

Admin Login Page:

The admin login page provides a secure gateway for system administrators to access the admin dashboard. Featuring traditional username and password fields, the interface ensures straightforward authentication. A login button facilitates seamless entry into the admin dashboard, where administrators can manage system settings, monitor user activity, and ensure the smooth operation of the electronic booklet system. By prioritizing security and simplicity in the admin login process, the system maintains robust access control while promoting efficient management of resources, ultimately enhancing the overall accessibility and functionality of the system for senior citizens.

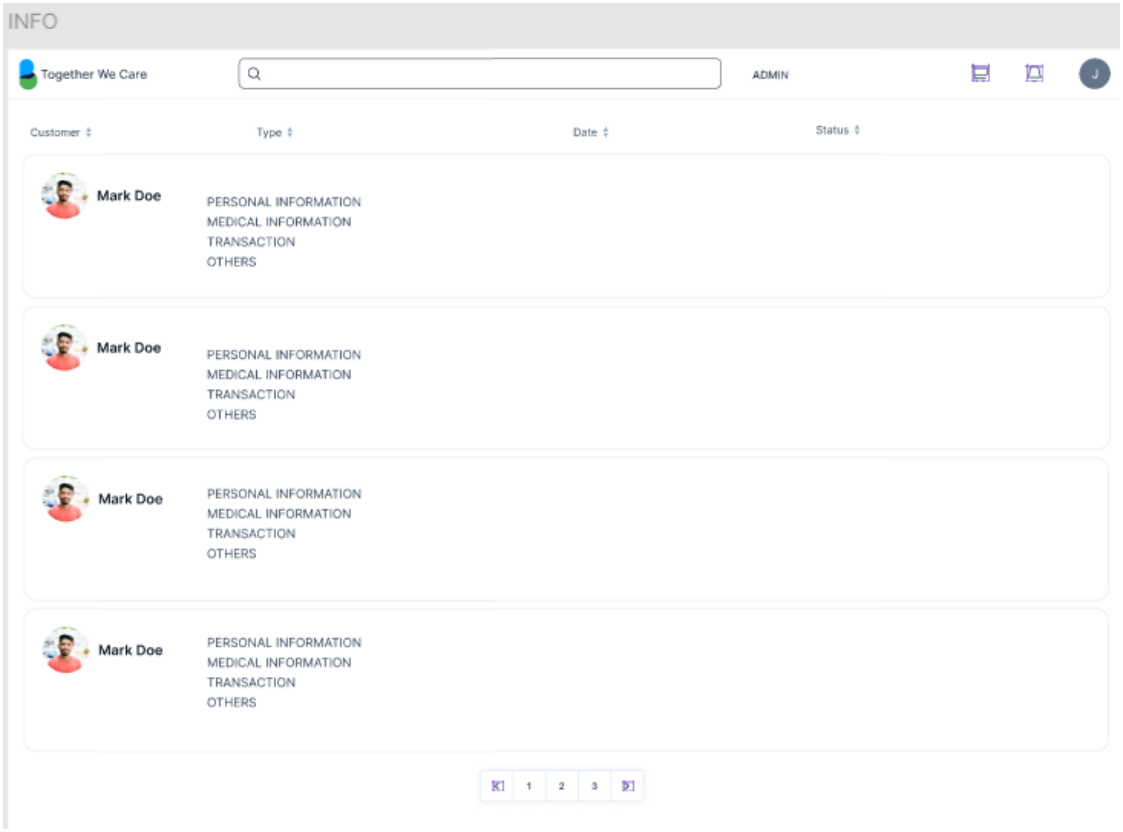

Figure 3.26 Senior Citizen Dashboard

Senior Citizen Dashboard:

The Senior Citizen dashboard serves as a comprehensive repository of senior citizen data framework. It contains vital details such as personal information, medical records, transaction history, and additional information like the pharmacies where seniors have purchased their medicines. This centralized resource facilitates efficient management and retrieval of senior citizen information, it provides tailored support and assistance. By integrating within the electronic booklet system, this feature enhances accessibility and ensures seamless coordination of services for the benefit of senior citizens.

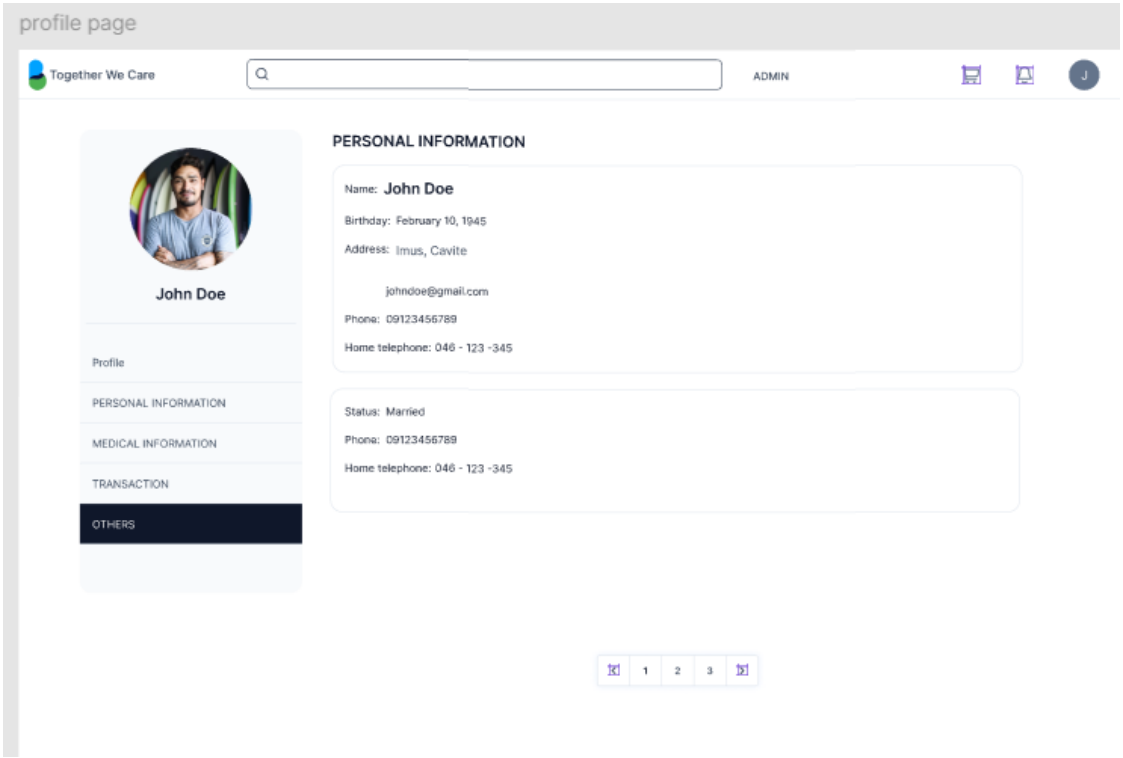

Figure 3.27 Senior Personal Information DASHBOARD

Senior citizen personal information dashboard:

The Senior citizen personal information dashboard provides detailed records of individual senior citizens' framework. Accessible through the information page, this profile displays essential details such as the senior citizen's name, address, and other personal information. With access to specific senior citizen profiles, this feature streamlines data management and facilitates tailored support for individual seniors. Through seamless integration with the electronic booklet system, Admins can efficiently address the unique needs of senior citizens, thereby enhancing accessibility and promoting their overall well-being.

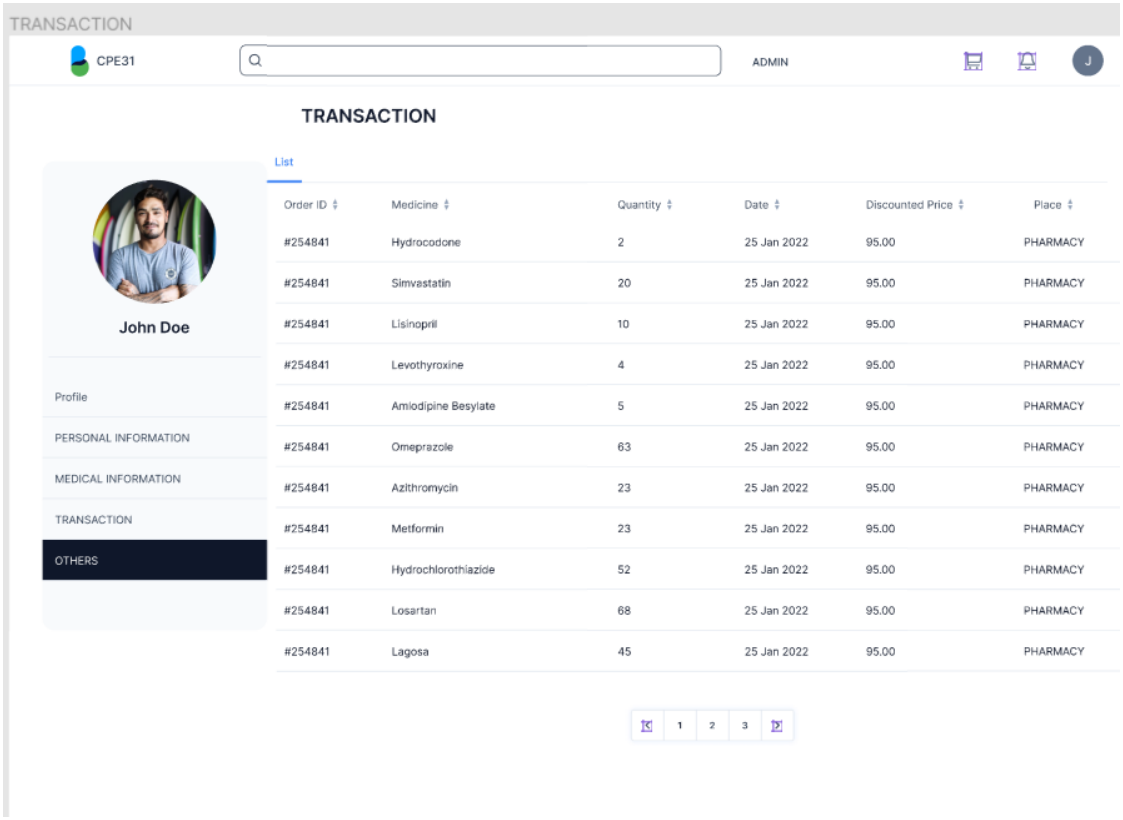

Figure 3.28 Senior Citizen Transaction

Senior Citizen Transaction:

The Senior Citizen Transaction page presents comprehensive records of senior citizen transactions for access. This page displays details such as the purchased medicine, quantity, purchase date, and the discounted price, along with information on where the senior citizen made the purchase. By centralizing transaction data, Admin gains insight into seniors' medication purchases and affordability, enabling tailored support and intervention strategies. Through seamless integration with the electronic booklet system, this feature enhances accessibility and promotes efficient management of senior citizens' healthcare needs.

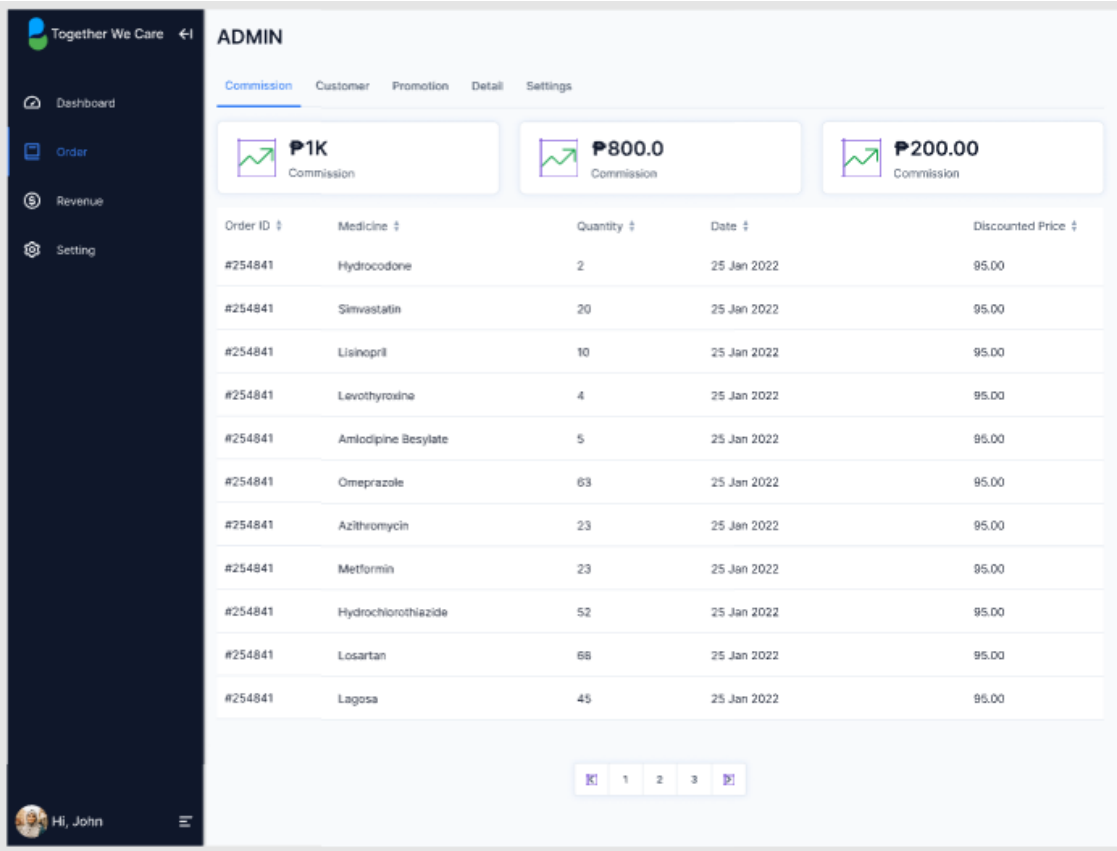

Figure 3.29 ADMIN DASHBOARD

Admin Dashboard:

The admin dashboard serves as a centralized platform for managing essential functionalities of the system, providing admins with an overview of user management, discount settings, transaction history, and reporting capabilities. With access to detailed transaction data and reporting tools, admins can analyze trends, monitor user behavior, and optimize discount offerings, ensuring tailored support for senior citizens. This comprehensive administrative interface prioritizes accessibility and usability, empowering admins to oversee and enhance the electronic booklet system's functionality for the benefit of senior citizens and other stakeholders.

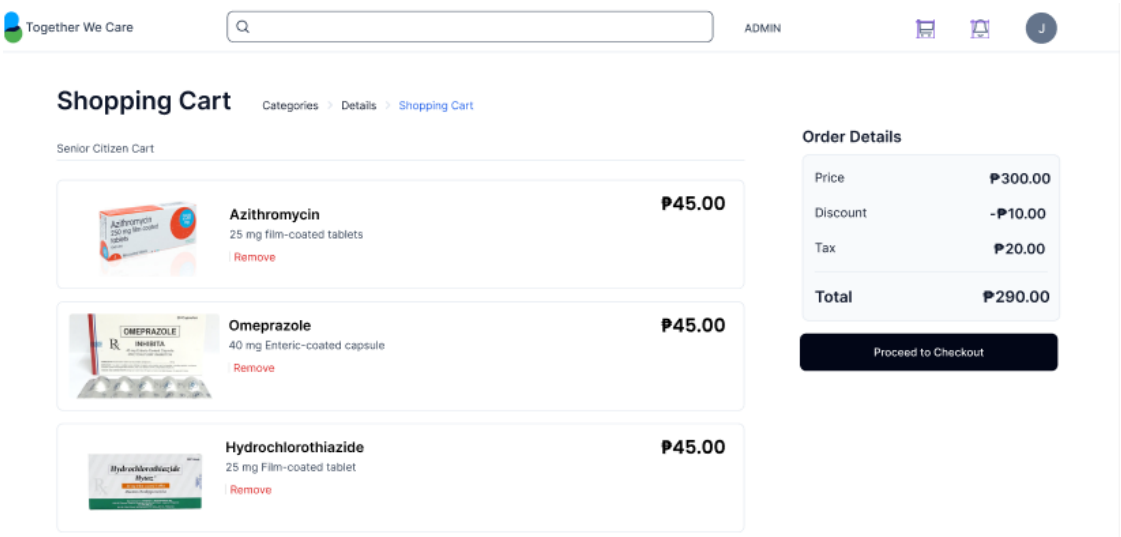

Figure 3.30 **SHOPPING CART**

Shopping cart page:

The shopping cart page serves as a convenient platform for senior citizens to manage their medication purchases seamlessly. Here, users can view the items of medicine selected for purchase and easily apply any discounts available specifically for senior citizens, ensuring affordability and accessibility. Moreover, the system integrates with the electronic booklet to automatically record the discounted medication purchases, enhancing convenience and streamlining the documentation process. By facilitating transparent and user-friendly medication transactions within the electronic booklet system, this feature underscores the study's commitment to empowering senior citizens with accessible and efficient healthcare management.

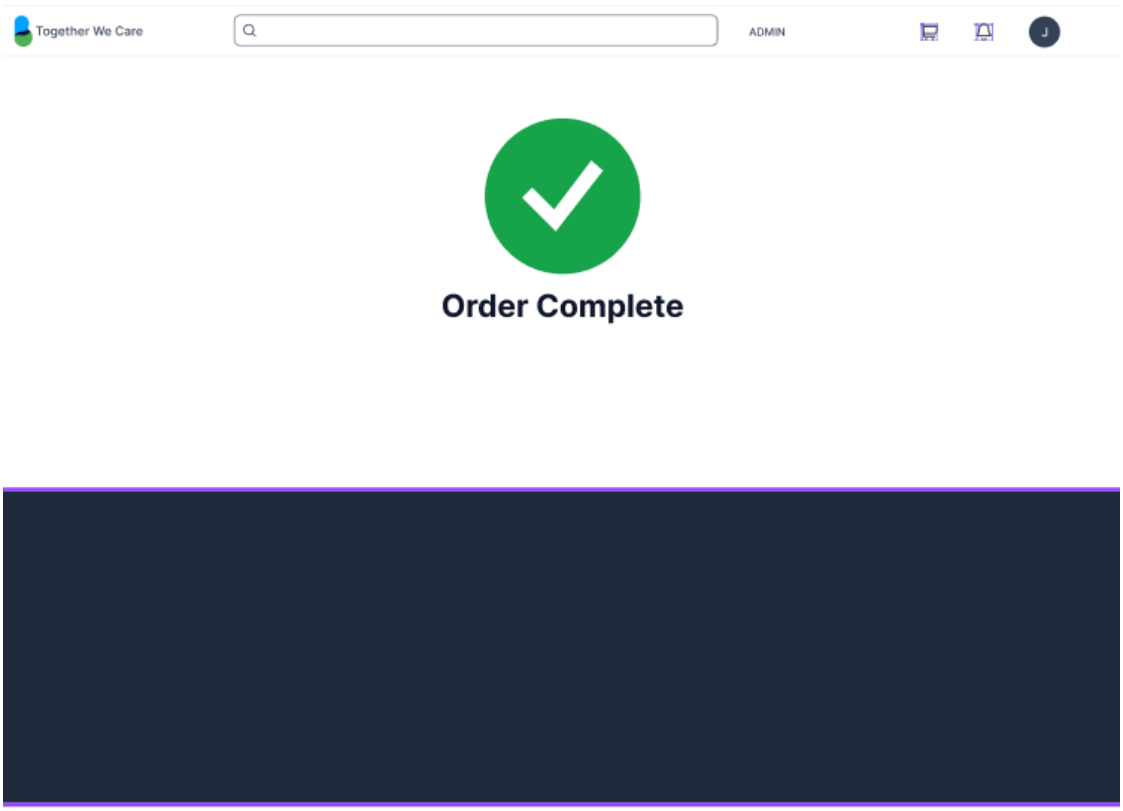

Figure 3.31 ORDER DONE

ORDER DONE:

The order confirmation page serves as a confirmation that the items in the shopping cart have been input by the pharmacy cashier and are ready to be processed for the senior citizen's records. This step ensures accuracy and transparency in the transaction process, providing assurance to both the pharmacy staff and the senior citizen regarding their purchases and data management.

3.17 Selection of Samples

In the selection of samples for the study, a comprehensive approach is undertaken to encompass a broad spectrum of perspectives and expertise relevant to the research objectives. The inclusion of diverse participant groups—encompassing senior citizens as well as experts in relevant fields such as pharmacists and medical professionals—reflects a commitment to capturing multifaceted insights into the accessibility challenges faced by senior citizens and informing the development of effective solutions.

- **Senior Citizens:** Central to the study are senior citizens themselves, whose lived experiences and perspectives provide invaluable insights into the accessibility barriers encountered in their daily lives. By including senior citizens as participants, the research seeks to understand firsthand the challenges they face in accessing essential services, navigating public spaces, and maintaining social connections. Their voices serve as the foundation for identifying key areas of concern and informing targeted interventions to enhance accessibility and quality of life for this demographic.

- **Experts in Relevant Fields (Pharmacists, Medical Field):** In addition to direct stakeholders, the study also engages experts in relevant fields—such as pharmacists and medical professionals—who possess specialized knowledge and expertise pertinent to senior citizen accessibility issues. These experts bring insights derived from their professional experiences and domain-specific knowledge, offering valuable perspectives on the healthcare, medication management, and mobility needs of senior citizens. By including experts as participants, the research benefits from their informed opinions and recommendations, facilitating the development of evidence-based interventions and strategies tailored to address the unique challenges faced by senior citizens.

By deliberately selecting samples that encompass senior citizens, and experts in relevant fields, the research endeavors to generate a nuanced understanding of the accessibility landscape from multiple angles. This inclusive approach ensures that the voices of those directly impacted by accessibility challenges, as well as the expertise of professionals working in relevant domains, are integrated into the development of solutions aimed at enhancing senior citizen accessibility and well-being.

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APPENDIX A: QUESTIONNAIRE

Senior Citizen Form

DE LA SALLE UNIVERSITY – DASMARINAS
Dasmarinas, Cavite
College of Engineering, Architecture and Technology
Engineering Department
Computer Engineering Program

Name: _____

Age: ____

Gender: _____

Address:

_____

_____

Technology Experience

1. How would you rate your familiarity with digital devices and technologies? *(Paano mo i-rate ang iyong pamilyar sa mga digital na aparato at teknolohiya?)*
   - Not familiar at all *(Hindi pamilyar sa lahat)*
   - Somewhat familiar *(medyo pamilyar)*
   - Very familiar
2. How often do you use a smartphone or tablet? (*Gaano kadalas mo ginagamit ang isang smartphone o tablet?)*
   - Daily
   - Weekly
   - Monthly
   - Rarely
   - Never
3. How would you rate your overall experience with technology? *(Paano mo ire-rate ang iyong pangkalahatang karanasan sa teknolohiya?)*
   - Excellent
   - Good
   - Average
   - Poor
   - Very poor

Experience with Traditional Booklets

4. How often do you use your senior citizen booklet? *(Gaano kadalas mo ginagamit ang booklet ng iyong senior citizen?)*
   - Daily
   - Weekly
   - Monthly
   - Rarely
   - Never
5. Have you ever experienced any issues with your traditional senior citizen booklet, such as: *(Nakaranas ka na ba ng anumang mga isyu sa iyong tradisyonal na buklet ng senior citizen, tulad ng:)*
   - Limited space to record information.
   - Risk of losing the booklet
   - Difficulty updating information.
   - Inconvenience of writing information
   - Delayed updates from the local government
   - None of the above
6. How convenient is the current process of collecting your information through face-to-face interviews with local government officials? *(Gaano kadali ang kasalukuyang proseso ng pagkolekta ng iyong impormasyon sa pamamagitan ng harapang panayam sa mga opisyal ng lokal na pamahalaan?)*
   - Very convenient
   - Somewhat convenient
   - Neutral
   - Somewhat inconvenient
   - Very inconvenient

E-booklet System Preferences

7. How interested are you in using an e-booklet system designed specifically for senior citizens? *(Gaano ka interesado sa paggamit ng isang sistema ng e-booklet na partikular na idinisenyo para sa mga senior citizen?)*
   - Very interested
   - Somewhat interested.
   - Neutral
   - Not very interested
   - Not interested at all
8. What features would you like to see in an e-booklet system for senior citizens? (Select all that apply) *(Anong mga tampok ang gusto mong makita sa isang sistema ng e-booklet para sa mga senior citizen? (Piliin ang lahat ng naaangkop)*
   - Ability to store and access multiple booklets.
   - Automatic updates and notifications
   - Ability to share booklets with family members or caregivers.
   - Large font size and high-contrast display
   - Simple and intuitive navigation
   - Other (please specify):

     _____

     _____
9. What concerns, if any, do you have about used an e-booklet system? (Select all that apply) *(Ano ang mga alalahanin, kung*

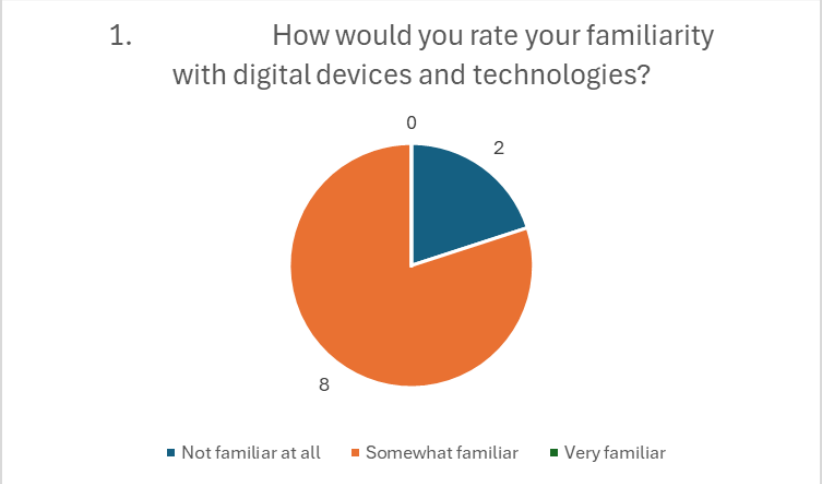
mayroon man, mayroon ka tungkol sa pinamit na sistema ng e-booklet? (Piliin ang lahat ng naaangkop)

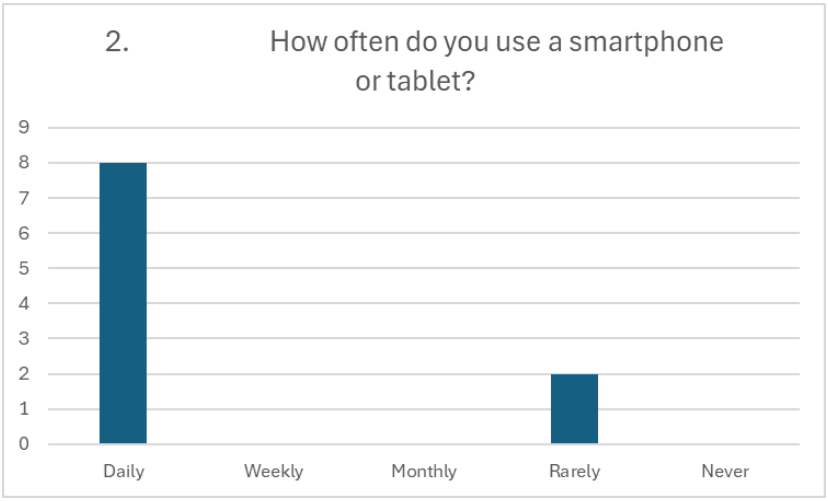
- Difficulty learning how to use the system.
- Lack of technical support or assistance
- Privacy and security concerns
- Preference for traditional physical booklets
- Concerns about the reliability and durability of electronic devices
- Other (please specify):

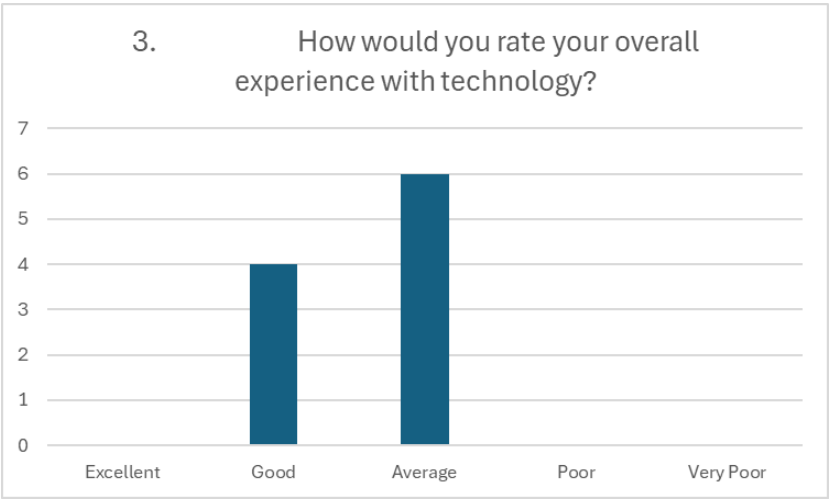
_____

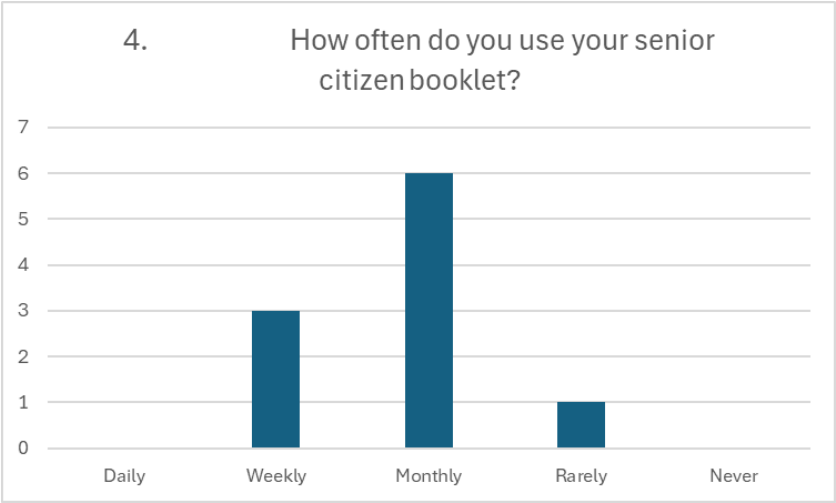
10. Do you have any additional comments or suggestions regarding the development of an e-booklet system for senior citizens? *(Mayroon ka bang anumang karagdagang mga komento o mungkahi tungkol sa pagbuo ng isang e-booklet system para sa mga senior citizen?)*

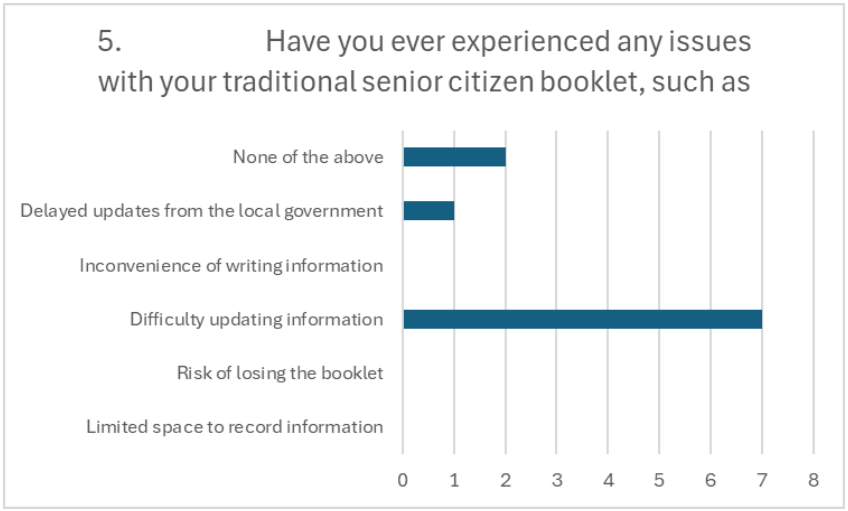
_____
_____
_____

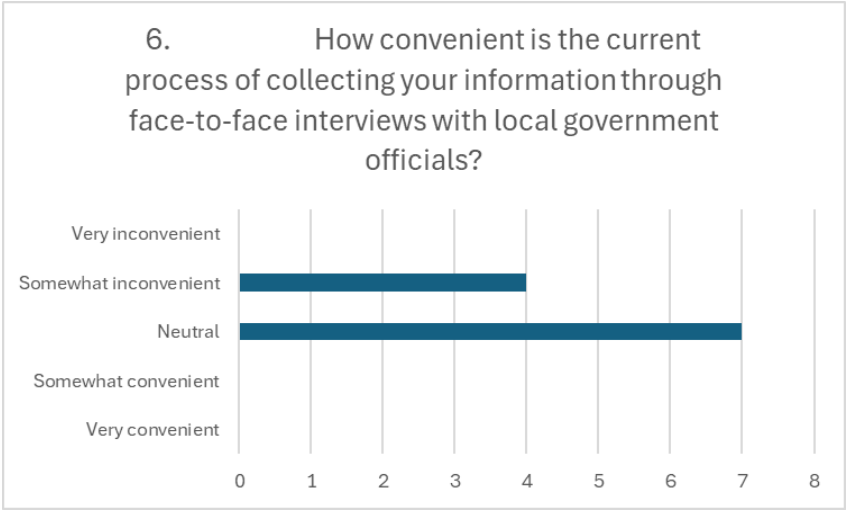


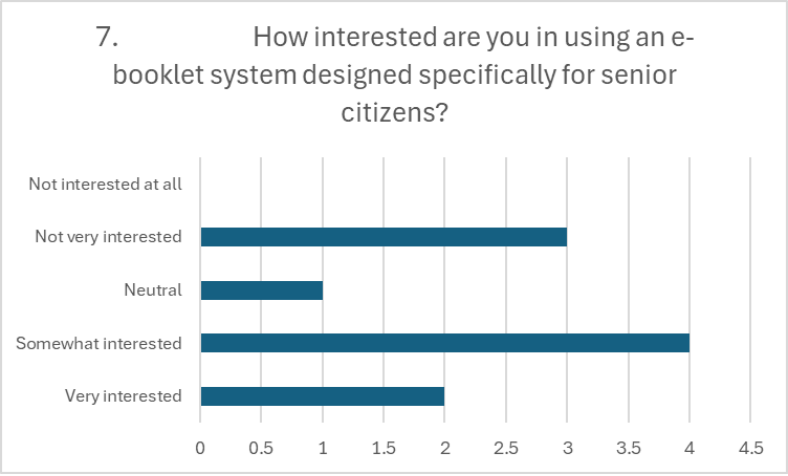

2. How often do you use a smartphone or tablet?
9
8
7
6
5
4
3
2
1
0
Daily
Weekly
Monthly
Rarely
Never

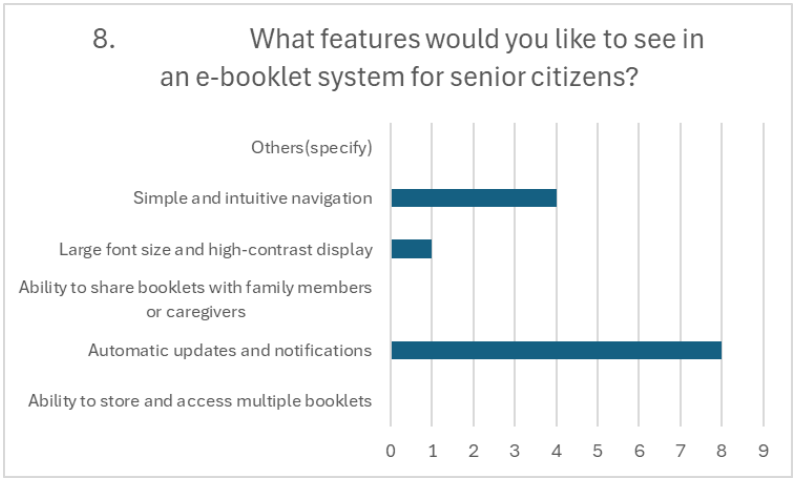

3. How would you rate your overall experience with technology?
7
6
5
4
3
2
1
0
Excellent
Good
Average
Poor
Very Poor

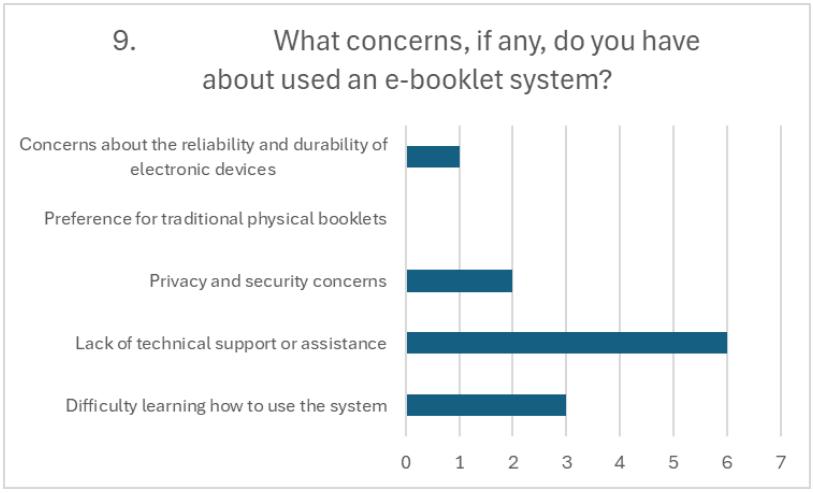

4. How often do you use your senior citizen booklet?
7
6
5
4
3
2
1
0
Daily
Weekly
Monthly
Rarely
Never


5. Have you ever experienced any issues with your traditional senior citizen booklet, such as
None of the above
Delayed updates from the local government
Inconvenience of writing information
Difficulty updating information
Risk of losing the booklet
Limited space to record information
0 1 2 3 4 5 6 7 8


6. How convenient is the current process of collecting your information through face-to-face interviews with local government officials?
Very inconvenient
Somewhat inconvenient
Neutral
Somewhat convenient
Very convenient
0 1 2 3 4 5 6 7 8


7. How interested are you in using an e-booklet system designed specifically for senior citizens?
Not interested at all
Not very interested
Neutral
Somewhat interested
Very interested
0 0.5 1 1.5 2 2.5 3 3.5 4 4.5





10. Do you have any additional comments or suggestions regarding the development of an e-booklet system for senior citizens?

One of the participants indicated that there is a need to have more information on the e-booklet for the needs of the senior citizens. Another senior citizen shared that the information on the benefits of senior citizens must be present in the booklet. Another senior citizen suggested the use of social media in updating senior citizens. Other answers include wanting the easiest way of using the e-booklet.

Pharmacy Form

DE LA SALLE UNIVERSITY – DASMARINAS
Dasmarinas, Cavite
College of Engineering, Architecture and Technology
Engineering Department
Computer Engineering Program

Name: _____

Age: ____

Gender: _____

Location of the store:

_____

Current System and Challenges

1. How do you currently manage records and information related to senior citizen benefits, discounts, and medication information in your pharmacy?
   - Traditional paper-based system (e.g., booklets, cards)
   - Electronic database system
   - Other (please specify):

     _____
     _____
2. How often do senior citizens present their traditional booklets at your pharmacy?
   - Daily
   - Weekly
   - Monthly
   - Rarely
   - Never
3. What are the main challenges or limitations you encounter with the current system for managing senior citizen records? (Select all that apply)
   - Limited storage capacity
   - Risk of booklet loss or damage
   - Delayed updates on information
   - Inconvenience of writing information
   - Other (please specify):

     _____
     _____

Technology Experience

4. How would you rate your pharmacy's overall experience with technology?
   - Excellent
   - Good
   - Average
   - Poor
   - Very poor
5. Does your pharmacy currently use any electronic or digital systems for record-keeping or patient management?
   - Yes
   - No

E-booklet System Preferences

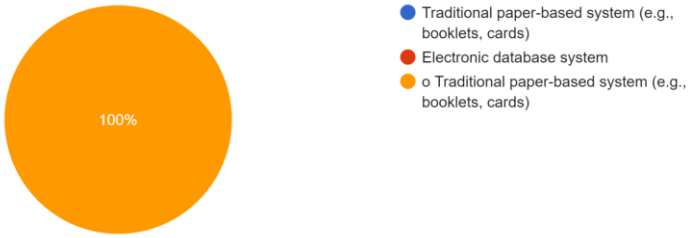
6. How interested would you be in adopting an electronic e-booklet system specifically designed for managing senior citizen records in your pharmacy?
   - Very interested
   - Somewhat interested
   - Not interested
   - Unsure
7. What features would you like to see in an e-booklet system for managing senior citizen records in your pharmacy? (e.g., easy data entry, automatic updates)
   - Easy data entry
   - Automatic updates on benefits and discounts
   - Integration with existing pharmacy software
   - Accessible interface for senior citizens
   - Other (please specify):

     _____
     _____
8. What concerns, if any, do you have about implementing an e-booklet system for senior citizens? (Select all that apply)
   - Cost of implementation and maintenance
   - Training and adoption by pharmacy staff
   - Privacy and security concerns
   - Compatibility with existing systems
   - Resistance from senior citizens to adopt new technology
   - None
9. Do you have any additional feedback or suggestions for improving the management of senior citizen records through an e-booklet system in pharmacies?

   _____
   _____
   _____
   _____

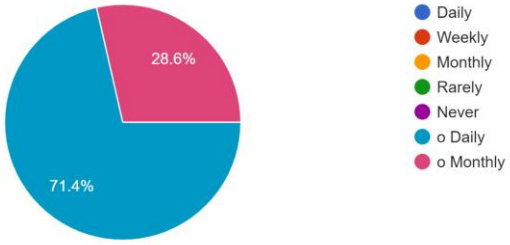
1. How do you currently manage records and information related to senior citizen benefits, discounts, and medication information in your pharmacy?

7 responses



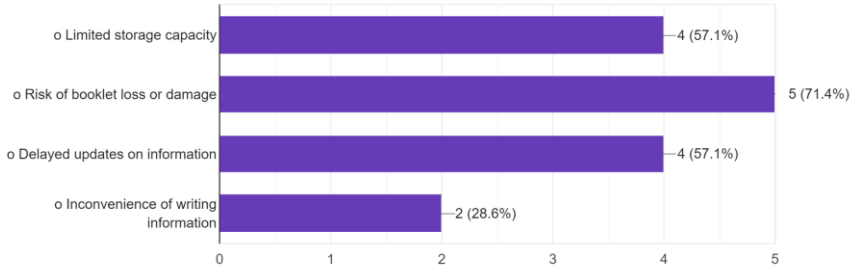
2. How often do senior citizens present their traditional booklets at your pharmacy?

7 responses



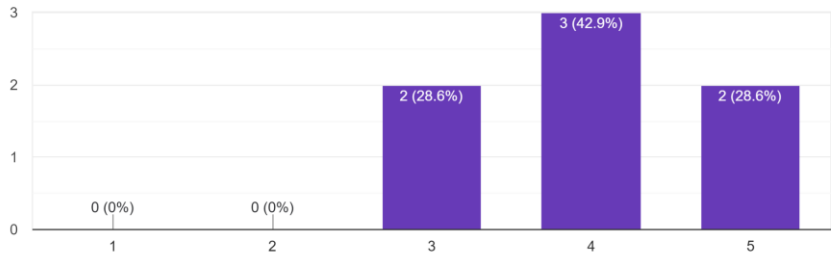
3. What are the main challenges or limitations you encounter with the current system for managing senior citizen records? (Select all that apply)

7 responses



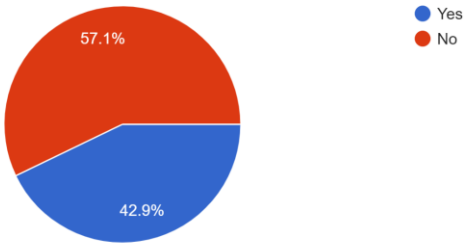
4. How would you rate your pharmacy's overall experience with technology?

7 responses



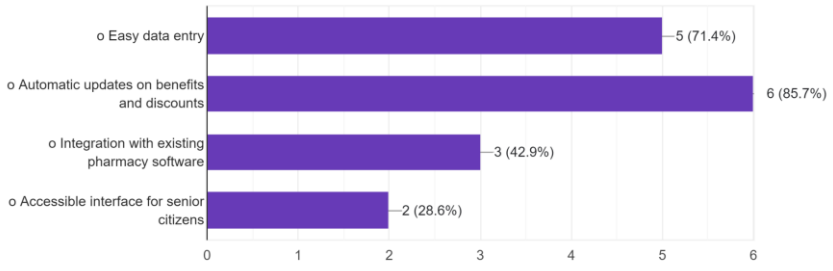
5. Does your pharmacy currently use any electronic or digital systems for record-keeping or patient management?

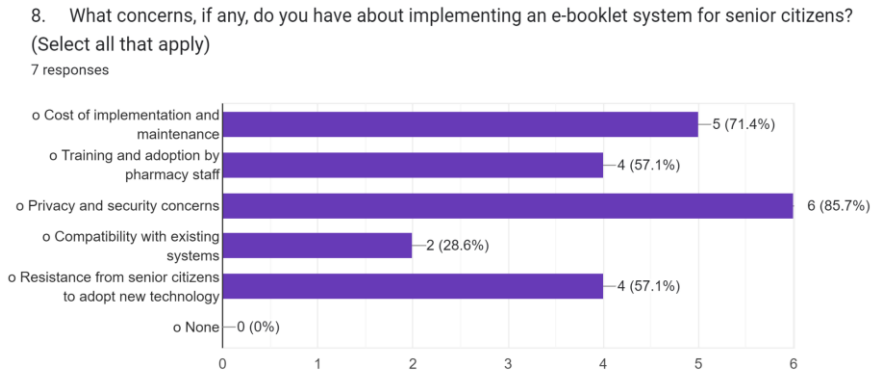
7 responses



7. What features would you like to see in an e-booklet system for managing senior citizen records in your pharmacy? (e.g., easy data entry, automatic updates)

7 responses





9. Do you have any additional feedback or suggestions for improving the management of senior citizen records through an e-booklet system in pharmacies?

Overall, The feedback suggests that the e-booklet system for managing senior citizen records in pharmacies is a promising idea for facilitating fast transactions. It emphasizes the importance of maintaining accuracy and regularly updating the information. There is also a desire for the program to be available soon. Additionally, ensuring data privacy and considering location-specific factors are crucial for the system's success.

APPENDIX B: ADVISER ENDORSEMENT SHEET

DE LA SALLE UNIVERSITY – DASMARINAS
Dasmarinas, Cavite
College of Engineering, Architecture and Technology
Engineering Department
Computer Engineering Program

ADVISER'S ENDORSEMENT FORM

April 26, 2024
Date

Prof. Kathleen Ann Villanueva
Subject Teacher CPE/ CEAT

I have evaluated the thesis study entitled *"Senior Citizen Accessibility: Developing an Electronic Booklet System using Biometrics"* by the following students Alyanna Ajay Arada, Drew Cedrick Alecha, and Christine Grace Nueva.

As their adviser, I fully endorse their thesis manuscript and allows them to present in an oral presentation (proposal, final) this 2nd semester of SY 2023 to 2024 .

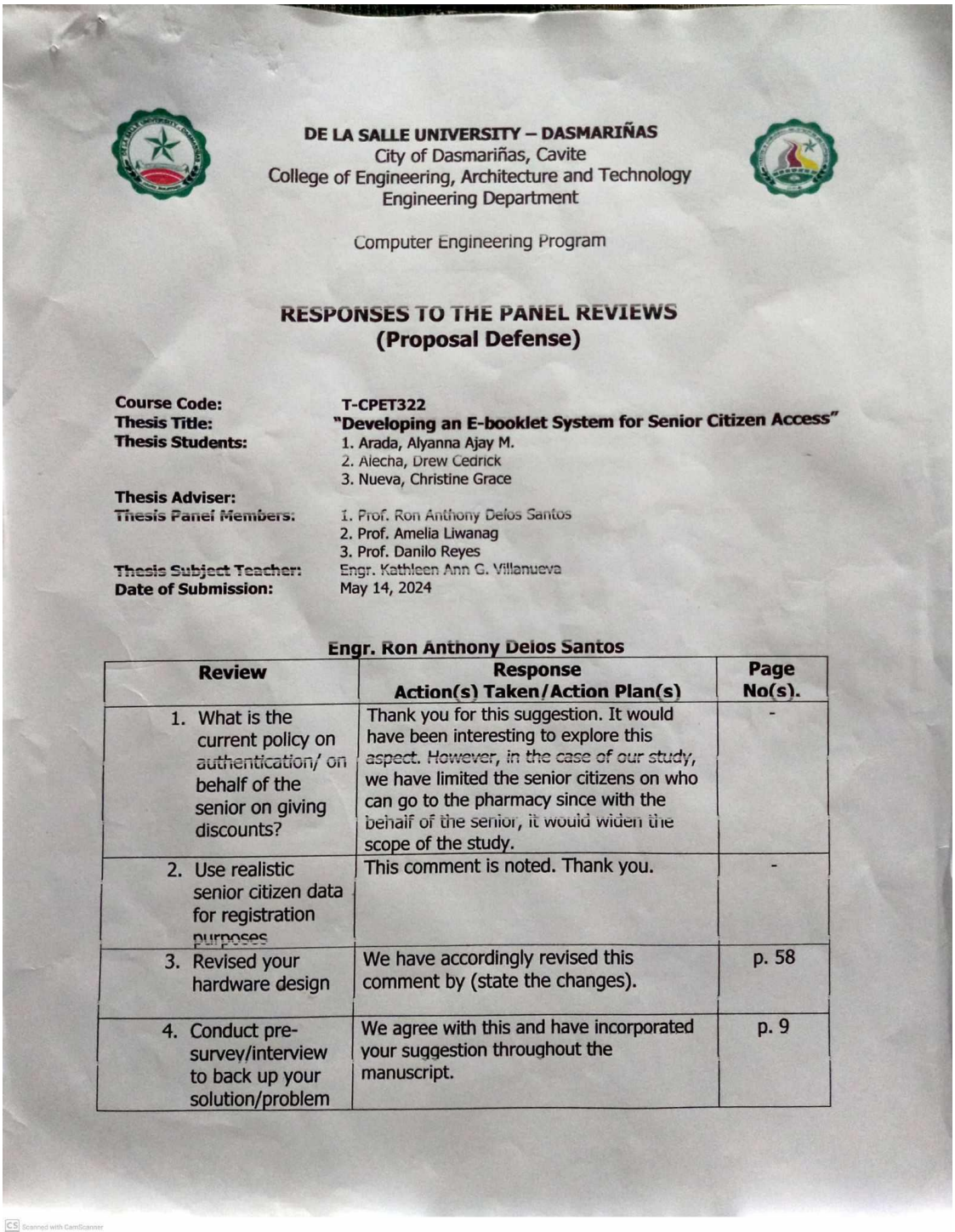
Prof. Joshua Isaguirre
Thesis Adviser

<Name of co-Adviser>
Thesis co-Adviser

BUDGET PLAN

ITEM (SOFTWARE COMPONENTS)	PRICE
MySQL Database Server	FREE/NO COST
Python Programming Language	
PyMySQL Library for Python	
ITEM (HARDWARE COMPONENTS)	
Fingerprint Scanner	P 2,500.00
Travel Expenses	P 1,000.00
Detachable Webcam	P 1,000.00
TOTAL	P 4500.00

APPENDIX C: RESPONSES TO THE PANEL REVIEWS



DE LA SALLE UNIVERSITY – DASMARIÑAS
City of Dasmariñas, Cavite
College of Engineering, Architecture and Technology
Engineering Department

Computer Engineering Program

RESPONSES TO THE PANEL REVIEWS
(Proposal Defense)

Course Code: T-CPET322
Thesis Title: "Developing an E-booklet System for Senior Citizen Access"
Thesis Students: 1. Arada, Alyanna Ajay M.
2. Alecha, Drew Cedrick
3. Nueva, Christine Grace
Thesis Adviser:
Thesis Panel Members: 1. Prof. Ron Anthony Delos Santos
2. Prof. Amelia Liwanag
3. Prof. Danilo Reyes
Thesis Subject Teacher: Engr. Kathleen Ann G. Villanueva
Date of Submission: May 14, 2024

Engr. Ron Anthony Delos Santos

Review	Response Action(s) Taken/Action Plan(s)	Page No(s).
1. What is the current policy on authentication/ on behalf of the senior on giving discounts?	Thank you for this suggestion. It would have been interesting to explore this aspect. However, in the case of our study, we have limited the senior citizens on who can go to the pharmacy since with the behalf of the senior, it would widen the scope of the study.	-
2. Use realistic senior citizen data for registration purposes	This comment is noted. Thank you.	-
3. Revised your hardware design	We have accordingly revised this comment by (state the changes).	p. 58
4. Conduct pre-survey/interview to back up your solution/problem	We agree with this and have incorporated your suggestion throughout the manuscript.	p. 9

5. Revised the general objectives	This is noted and changed.	p.10
6. System flowchart from start to finish	This is noted po. Thank you	p.39 to p.48

Engr. Amelia Liwanag

Review	Response Action(s) Taken/Action Plan(s)	Page No(s).
1. System design process & design – should include details /contents	Added details and content related to other Panelist's mentions/suggestions. Revised Accordingly.	p.36 to p.37
2. Revise no. 1 specific objectives – add controller	This comment is noted. Thank you.	~~p.9~~ p.10
3. Include process flow for ease of use from registration	Indicated in Software Process.	p.54 to p.56
4. Revise general objective	Noted po.	p.10
5. Include system architecture	Noted po. This has been revised.	p.49, p.50
6. Include testing methodology	Revised Section.	~~p.37, p.38,~~ ~~p.39~~ p.35, p.36
7. Include pre-evaluation interview	Mentioned in Data Gathering Procedure.	p.31 ~~p.30~~ to p.32

Prof. Danilo Reyes

Review	Response Action(s) Taken/Action Plan(s)	Page No(s).
1. Change general objectives	Noted po.	p.9
2. Change specific objectives	Noted po.	p.10
3. Can be used without WIFI	Addressed in Chapter 1 (Objectives, Scope/Limitations, Conceptual Framework)	p.10, p.12, p.15
4. Registration with camera	Addressed in Chapter 1 (Objectives, Scope/Limitations)	p.10, p.12
5.		

Prepared by:

Arada, Aiyanna Ajay M.

Alecha, Drew Cedrick

Nueva, Christine Grace

Name and Signature of Thesis Students

Noted by:

Prof. Joshua Isaguirre

Name and Signature of Thesis Adviser

APPENDIX D: CONSENT FORM

DE LA SALLE UNIVERSITY – DASMARINAS
Dasmarinas, Cavite
College of Engineering, Architecture and Technology
Engineering Department
Computer Engineering Program

CONSENT FORM

To whom it may concern,

We are the students of DLSU-D namely the following students Alyanna Ajay Arada, Drew Cedrick Alecha, and Christine Grace Nueva. We are conducting research for our thesis project titled "Developing an E-booklet System for Senior Citizen Access."

We are writing to request your consent to participate in this survey. Your participation and cooperation would greatly contribute to the success of the thesis project and the development of an e-booklet system for senior citizens. The purpose of this study is to develop an e-booklet system designed specifically for senior citizens access and use. The system aims to provide an easy-to-use digital platform to the needs and preferences of older adults.

Attached to this letter is a copy of the survey questionnaire and the survey will take approximately 5-10 minutes to complete. All information collected during this study will be kept strictly confidential in accordance with the Data Privacy Act of 2012 (Republic Act No. 10173) of the Philippines. Your responses will be anonymized, and no personally identifiable information will be associated with the data. The collected data will be used solely for the purposes of this research study and will not be shared or distributed without your explicit consent.

By signing below, you acknowledge that you have read and understood the information provided in this consent form and agree to participate in the study.
Participant's Name: _____
Participant's Signature: _____
Date: _____
Thank you for your consideration and participation.

If you have any questions or concerns about this study, please feel free to contact the researchers at aam0178@dlsud.edu.ph or 09952401516.

Noted by:

_____

Prof. Joshua Isaguirre **(THESIS ADVISER)**