MECHANISM TO PREVENT MEDICINE FROM GETTING WASTED

A PROJECT REPORT

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CERTIFICATE

This is to certify that the Project report "**Mechanism to prevent medicine from getting wasted"** being submitted by **"Deepshika R, Thushani, Yashica V, Jnanavi C"** bearing roll number(s) **"20211CSE0731, 20211CSE0791, 20211CSE0505, 20211CSE0721"** in partial fulfilment of the requirement for the award of the degree of Bachelor of Technology in Computer Science and Engineering is a Bonafede work carried out under my supervision.

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DECLARATION

We hereby declare that the work, which is being presented in the project report entitled in "**Mechanism to prevent medicines from getting wasted"** partial fulfilment for the award of Degree of **Bachelor of Technology** in **Computer Science and Engineering**, is a record of our own investigations carried under the guidance of **Dr Chandra Sekhar M, Professor, School of Computer Science Engineering Presidency University, Bengaluru.**

We have not submitted the matter presented in this report anywhere for the award of any other Degree.

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ABSTRACT

Most healthcare systems worldwide incur severe economic and environmental burdens through medication waste. Most of this wastage is avoidable, and research findings suggest that strategic interventions, particularly those involving pharmacists, can prevent a significant percentage of wastage. Pharmacists are key professionals in reducing medication wastage through interventions such as shared decision-making with the patient, medication redistribution, and reduction of the dispensing interval. Such strategies carry many benefits, but there are also some barriers to be overcome, such as arguments surrounding the feasibility and low economic value of returned medications. Another key factor is the willingness of patients participating in the re-dispensing systems, and proper awareness and education on the importance of returning unused medications play a crucial role in achieving success.

In light of these challenges, this project is to design an all-inclusive website with the objective of wastage of medicines through better management of medication. The website will be helpful to various users: patients, pharmacies, and health providers through its tools in tracking the medication inventory, reminding the patients on the expiration dates of the medicines, and the safe disposal or donation of unused medicines. There are also plans for educational tools available on the platform to inform and engage the patients in their efforts to collect used medications, redirect them through safe return systems and re-dispensing of reused medications. Such aspects will promote an integrated system from the online level down to ensuring healthier, environmentally responsible medication management processes. This shall be a long-term management of medicine waste problems along the spectrum as it shall promote mutualism among key partners in designing effective, robust solutions.

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We thank our family and friends for the strong support and inspiration they have provided us in bringing out this project.

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Chapter 1: Introduction

1.1 Motivation

The motivation behind this project is the reduction of medicine wastage, which is becoming a growing concern, especially for medicines nearing their expiration dates. This system bridges the gap by allowing donations of medicines to NGOs, ensuring that those in need receive the medications, preventing wastage, and contributing to healthcare sustainability.

1.2 Problem Statement

In the current setup, medicines due to expire remain unused. In this system, there is no provision to forward these medicines towards the needy sectors, such as NGOs. These result in two losses: the wastage itself and the missing opportunity to present essential medical necessities to the destitute public.

1.3 Goal of the Project

The goal of the project is to minimize the waste of medicine by helping nearing-expiry medicines be donated, promoting sustainability, and getting the medicines to the people in the best possible inventory and donation management way.

1.4 Scope

This will include management of medicine inventory by sellers, monitoring medicines approaching the expiration date, allowing user purchase, and rerouting expired or reusable medicines to NGOs. The scope of the platform is towards reduction of waste, optimization of the inventory management process, and easier access to medical supplies to both users and society.

1.5 Project Introduction

This project introduces a system that reduces medicine wastage by ensuring that nearing-expiry medicines are donated to NGOs. It involves seller inventory management, admin tracking of expired products, and user-driven requests. The system ensures better utilization of available resources, making a positive impact on both the environment and healthcare

Chapter 2: Literature Review

2. LITERATURE SURVEY

2.1 Related Work

[1] Sharanya S Bhat; K Shraddha; A.S Bhavana; Shreyas Suresh Rao || Digital Medicine Assistant-Health Application for Expiry Tracking || 19-21 November 2021.

Everyone's life is affected by drugs; some assist us in dealing with illnesses, conditions, or aches, while others are essential for maintaining our lives. Some are very costly, and others are scarce and have to be purchased in advance in remote locations. The most common problem is that we all tend to forget when our medications expire, or sometimes the strips tear off, rendering the information about the tablet or drug inaccessible.

We all spend our time writing down the same in notepads and waste time in labelling the medicines. Many try to organize their prescriptions for maintaining proper dosage information of the medicines but there is always a possibility of losing them. Notepads, keynotes and alarm reminders might come easy to us at the first thought but are not an efficient solution. There is no way of getting reminded about the expiry of any of the medi-cines that's written in a notepad. Most of the traditional applications provides the option to remind about the medicines that need to be taken on a regular basis or provide a single reminder for the expiry of medicines that are available in its entry that users can remove them from the mobile notification panel due to being busy. Apart from that, most applications available provide the feature of tracking expiry much more generally than just limited to medicines. This paper is regarding an application which provides a much more convenient and effective solution to the problem and, to the best of our knowledge, is the first application designed to remind its user through reminder notifications about the expired and about to expire medicines.

[2] Muhammad Nazrul Islam; Ashratuz Zavin; Sanjana Srabanti; Chowdhury Nawrin Ferdous; Sayma Alam Suha; Lameya Afroze || GiveMed: A webportal for medicine distribution among poverty-stricken people || 21-23 December 2017.

Extreme poverty has not yet abated to impact a large fraction of the populace. The poor and low income groups are not able to afford as much medical treatment as they do today. As such, the number of deaths grows every day and they die out from a multiplicity of causes. However there

Many patients have much left even after they have finished taking their medicines. We recommend, in this study, an online service called 'Give Med' for the distribution of medicines.Give Med is a website through which contributors donate their unwanted medicines to low-income or impoverished patients who require the same. The proper use of unwanted medicines through this method will reduce the national health services' cost and help provide better healthcare to the poorer sections of society. 16 users that included physicians, donors, NGO staff, and low-income people tested the portal, and it was concluded that it was an extremely successful, efficient, user-friendly, and gratifying system.

[3] Ranula Gihara Gamage; Nandana Senarath Bandara; Dunya Dulashani Diyamullage; Kanchala Upethri Senadeera; Kavinga Yapa Abeywardena; Nelum Amarasena || PharmaGo-An Online Pharmaceutical Ordering Platform || 09-11 December 2021.

[4] Dhessamine Maghinay; Christopher Ian Florece; Gabriel Taneza; Paul Jeo Fronda; Michael N. Young || A Comprehensive Study on the Effect of Using Online based Drug Ordering Application for Drug Purchasing Optimization || 23-26 April 2021.

One of the most basic pillars of health is pharmacy services. People are required to be socially distanced because of the COVID-19 pandemic. It is, thus, a need to have an online service through which medicines are dispensed. Online pharmacies have turned out to be a very trendy way of availing the proper medication since many nations' quarantines measures have put the virus at a halt. Today, every pharmacy in Sri Lanka has its specific mobile applications in order to render its clients an online pharmaceutical service.

However, one pharmacy may not have all of the medications that the consumer requires. By collaboration, PharmaGo assists its clients in acquiring the medications required at one pharmacy instead of visiting one after the other. In a similar fashion, pharmacy

operators may use image processing tools to read the prescription and undoubtedly identify which medications are required. In addition, the technology studies past sales data and gives a projection of medicine demand in the near future to the pharmacy operators. Furthermore, PharmaGo has an extremely well-qualified AI medical chatbot to help clients understand the entire process. PharmaGo offers a reliable platform to fulfill the specific requirements of pharmacy services for both pharmacists and consumers of pharmacies.

[5] A. Jeandron; M. Page; B. Comte; C. Blanc-Gonnet || Improving practices in medical equipment support projects || 18-19 September 2012

Most of the medical equipment in the hospitals of the developing countries are nowadays out of order according to several articles. A large proportion of it may have been donated or sold at grossly concessionary prices by the medical equipment support programs of the developed countries. The reasons for this are well identified. A French non-profit organization called HUMATEM has concentrated on consulting organizations operating medical equipment support programs in an attempt to correct it.

Our approach, based on WHO guidelines for medical equipment donations [1], is focused on three main areas: enhancing the technical quality of the donated devices, motivating stakeholders to take ownership of project quality improvement, and, lastly, advancing biomedical careers. We have designed realistic papers, procedures, and services that cater to a broad range of potential issues and are accessible to all parties involved- hospitals, financing partners, equipment requesters, and donors.

Chapter 3: System Design and Architecture

System Overview

3.1 Existing System:

Currently, there is no effective organization and management for drugs approaching expiration dates. Without an effective, integrated management system, the majority of these drugs were simply discarded while alive. This would be one more missed opportunity to get near-expiry medicines to those that need them most, including people in underdeveloped or resource-poor districts.

There is no connecting system for users, vendors, and NGOs, and the whole process of redistributing these medications is not streamlined or coordinated. The sellers might not be aware of the existent resources that would really help vulnerable populations, while the users may not access these medicines before they expire. Such NGOs are seldom integrated into the supply chain for such medicines. This makes them unable to easily receive or distribute the donations properly.

Thus, the life-saving drugs that otherwise could be routed to patients awaiting them go down the drain, and the otherwise much-needed aid is wasted without ever reaching their intended recipients-to-waste those resources because they don't get utilized before their shelf life expires. This inefficiency does not only incur financial loss but also deprives medicines of reaching the most needy people. A coordinated platform connecting vendors, users, and NGOs could significantly reduce this wastage by allowing medicines nearing expiration to be repurposed for donation, ensuring that they serve their intended purpose and are used to support public health rather than going to waste.

3.2 Drawbacks

The existing system throws up many grave issues that make it difficult to handle and disburse medicines adequately, particularly the near-expiry medicines. The following points are critical problems thus identified:

1. No Proper In-Charge Handling of Near-Expiry Medicines:

No tracking or management system of medicines nearing the end of their date has been established.The result is the wastage of a great proportion of usable medicines that would have been administered had they been sent to areas with the highest requirement for them. A mechanism for their identification and diversion into areas where their use will benefit the greatest majority is also nonexistent.

2. Medicines Wasted Because of No Re-Direction:

Medicines, especially those close to their expiration dates, are not used because there is no proper re-direction to the communities or organizations that may need them. This leads to significant waste since such medicines could have been useful for patients in deprived or underserved areas. In the absence of a mechanism to re-direct such medicines, the resources are not utilized to their fullest potential.

3. Inadequate coordination between vendors, users and NGOs

Coordination among the parties involved in medicine distribution is weak. Sellers, users, and NGOs usually work in isolation from each other, hence inefficiency in donating and distributing medicines. Lack of an effective communication platform makes it difficult to transfer urgently needed medicines from the shelf before they reach near-expiration or excess drugs that could have been redirected for urgent use.

4. Missed opportunities of using donated drugs in disadvantaged areas:

One of the major drawbacks in the current system is that it does not provide sufficient scope for donated medicines to reach deprived or underprivileged areas. Without an appropriate structure that connects donors, NGOs, and recipients in these areas, the donated medicines become a waste or are left unused. It can be prevented if an efficient delivery network is there that ensures that medicines reach the most needed places.

5. Poor Inventory Management Increases Wastage:

Inefficient management of inventory has been one of the main causes for higher wastage. It is seen that medicines are not closely monitored and their shelf life is not checked in real-time. The absence of monitoring results in overstocking some medicines and some may go

expired before being consumed, while some remain understocked or not available when needed. An improved monitoring and management inventory system can reduce waste, ensure that drugs are used on time, and improve resource use. Such inefficiencies can only be rectified with an integrated system that tracks near-expiry medicines, streamlines the redistribution process, enhances coordination among stakeholders, and improves practices related to the management of their inventory. With such inefficiencies remedied, there would be a decrease in the wastage of medicine to a huge extent, optimization of resources use, and ensured medicine delivery to communities that need it the most.

3.3 Proposed System

This system provides a single system or centralized platform designed to address the issues of near-expiry and expired medicines, ensuring they get used instead of going waste. Multiple component pieces streamline the management, donation, and distribution of medicines nearing expiration.

1. Seller Stock Management:

Regular inventory updates by the sellers, like pharmacies, suppliers, and distributors are made on this platform. This helps in tagging near-expiring medicines so that sellers can easily recognize them in the system. Near-expiring medicines will not be left unnoticed and unsold on the platform by the sellers as they can view the list before the medicines become obsolete.

2. User Ordering and Donation Requests:

The users on the site can view the medicines that are available and place orders for the products they need. However, when the users encounter medicines that are near their expiration dates, the system offers them the opportunity to request a donation instead of buying the item. This ensures that such medicines do not go to waste but are redistributed to individuals or organizations that could use them.

3. Admin Monitoring and Collection of Expired Medicines:

Upon flagging medicines as either expired or about to expire, the admin on the platform oversees collecting those medicines. Admins track the flagged items and coordinate with

sellers to ensure safe collection. Such a process ensures that expired medicines do not reach the market to cause harm in future transactions.

4. NGO Coordination and Distribution:

The admin team collects expired or near-expiry medicines and then distributes them to registered NGOs. These NGOs are working in underprivileged communities or regions with a lack of access to healthcare resources. The system makes sure that the medicines reach those who may not be able to get the required medications otherwise. This distribution maximizes the utility of the medicines and ensures that they serve their purpose before being discarded.

5. Reduce Waste and Optimize Resources:

Among the prime goals of this website is to minimize wastage of medicines. With the efficient handling of near-expiry stock and redistributing the medicines to NGOs and users, the system lessens the quantities of medicine that otherwise would be thrown into the dustbin. This strategy, apart from optimizing the use of existing resources, goes a long way in sustaining health care by ensuring that the utilization of medicines is up to their expiry dates.

6. **Access to Health Care:**

The system provides improved access to medicines for the most vulnerable. The coordination of sellers, users, and NGOs through this platform creates a network that guarantees that medicines are provided to the most needy people. This may be very impactful in low-income or rural areas where access to such essential medications is limited. This system helps to repurpose near-expiry medicines that would otherwise go unused and are redirected to those in need, thereby improving health outcomes for underserved communities. This system thus summarises how, on the whole, a system could effectively be set up for handling near-expiration and expired drugs through a function to mark off medicines from a seller's database, allow requesting donors through an individual user account, and direct such redistributions to NGOs or admins for eventual redistric. Thus, minimizing waste in addition to steering useful resources into people's lives optimizes health delivery in light of sustainable management.

3.4 Benefits

1. Minimization of Medicine Waste:

The system reduces medicine wastage to a great extent by diverting near-expiry medicines to NGOs, so that these resources are not wasted. Instead, they are utilized to cater to the health needs of the deprived sections of society. This proactive approach to managing near-expiry stock prevents medicines from going to waste and optimizes their utility.

2. Effective Inventory Management:

The platform ensures that sellers can track inventory levels, expiry dates, and product movement by providing a structured and systematic approach for monitoring medicines. This improves stock management and helps avoid overstocking or understocking, ensuring that medicines are used before they expire and that there is a steady supply of essential products available for donation or purchase.

3. Sustainable Redistribution of Resources:

This system presents a viable way of addressing the unused medicinal resources by facilitating the redistribution of near-expiration and expired drugs to those in most need of them. The process minimizes environmental degradation as a result of discarded unused drugs and contributes towards more responsible healthcare provision since resources will be maximally utilized, particularly in resource-scarce areas.

4. Promotion of Social Responsibility and Community Engagement:

The platform promotes social responsibility through the participation of sellers, users, and NGOs in the redistribution of medicines. Sellers are motivated to flag near-expiry items, users are incentivized to request donations, and NGOs play a key role in delivering medicines to those in need. This community involvement fosters a sense of collective responsibility and strengthens the social fabric around healthcare support.

5. Increased Access to Life-Saving Medicines:

The platform improves access to lifesaving medicines, especially in places where health facilities are scarce. By redirecting near-expired medicines to deprived communities, the system closes

the gap in the availability of essential medicines, mainly for the most vulnerable people who could not afford to buy them.

6. Enhanced Inter-actor Cooperation:

The system ensures proper coordination between key stakeholders—the sellers, the users, and NGOs—and builds a network of cooperation for achieving the goal of waste medicine reduction and increasing healthcare accessibility. Thus, collaboration boosts the general efficiency and effectiveness of the health system by better equitability and efficiency in the medicine delivery system.

7. Healthcare System Support for Low-Income Regions:

By routing medicines to NGOs and communities in need, the platform supports the healthcare infrastructure of low-income regions that often face shortages of essential drugs. This system ensures that medical supplies are directed to where they are most urgently needed, helping to strengthen healthcare delivery in underserved areas and providing a vital safety net for the population.

8. Transparency and Accountability in Medicine Distribution:

The platform promotes transparency by tracking the flow of medicines from sellers to NGOs, ensuring medicines are appropriately donated and distributed. This accountability creates trust among the stakeholders and makes sure that medicines donated are put to responsible use, thus making sure that redistribution is effective and ethical.

9. Promotion of Ethical Medical Practices:

The system ensures the use of all medicines up to their expiry dates, thereby enhancing ethical medical practice. It thus avoids the wasting of medical resources by ensuring valuable medicines are exploited to their optimal levels. The culture of sustainability and responsibility becomes a part of health care as international efforts are towards waste reduction and ethical resource consumption.

10. Economic Savings for Health Care Systems:

This also leads to the saving of costs by the NGOs and healthcare providers in underserved

regions. NGOs are thus able to reduce their procurement cost, directly allocating other resources to improve their ability to provide care to the communities they serve by having donations received of medicines that otherwise would have gone waste.

In summary, this system provides a holistic solution that reduces medicine wastage, ensures optimal inventory management, and creates a more sustainable and equitable approach to healthcare resource distribution. It promotes social responsibility, enhances access to essential medicines, and fosters collaboration between stakeholders to improve healthcare outcomes, particularly in underserved communities.

Chapter 4: Requirement Analysis

4.1 Function and non-functional requirements

Functional and non-functional requirements:

Analysis of requirements is very important in deciding whether a system or software project is successful because it ensures that the project effectively meets both user and business needs. The gathering of requirements provides the basis for system design, development, and finally, deployment. Generally, needs can be broadly categorized into two: functional and non-functional.

Functional requirements describe the specific behaviors, functions, and tasks the system must perform. In other words, this refers to what the system has to do, such as focusing on interactions between users and systems. For instance, a medicine management app could have functional requirements such as the ability to add new medicines, set dosage schedules, receive notifications for expiring medications, and generate reports of medication history. These are typically directly associated with the primary business objectives of the system and serve as a basis for evaluating the system's ability to deliver against those requirements.

Examples of functional requirements:

1)User authentication each time he/she logs into the system

2)Shut down the system in case of a cyber-attack

Non-functional requirements, by contrast, characterize the system in terms of performance, reliability, scalability, security, and other quality attributes. It is more concerned with how something should be performed rather than what should be performed. Non-functional requirements include performance metrics such as the response time, availability, and throughput. Besides that, the utility, maintainability, and compatibility with other platforms are also considered non-functional requirements. For example, in the case of the medicine

management app, non-functional requirements could be that the app should be able to support thousands of users at a time without crashing, that it works with minimal delay when alerting users, and that it complies with data protection regulations, thus keeping the health information of the users safe.

They basically involve issues such as:

•Portability

•Security

•Maintainability

•Reliability

•Scalability

•Performance

•Reusability

•Flexibility

Examples of non-functional requirements:

1) All emails should be sent with latency of no more than 12 hours from such activity.

2) The processing time of each request to be within 10 seconds

3) Load time of site should be < 3 seconds in case simultaneous users are > 10000

Functional and non-functional requirements are the backbone of any project. While functional requirements ensure that the system completes its intended purpose and meets the users' primary demands, non-functional requirements ensure that it works efficiently, securely, and reliably under various conditions. Well-balanced analysis of the two categories of requirements in the planning phase is essential in building a system that is high-performing, secure, and scalable.

4.2 Hardware Requirements

H/W System Configuration: -

Processor - I3/Intel Processor

RAM - 8 GB

•Hard Disk - 1TB

4.3 Software Requirements

•Operating System - Windows 10\t

•JDK - java

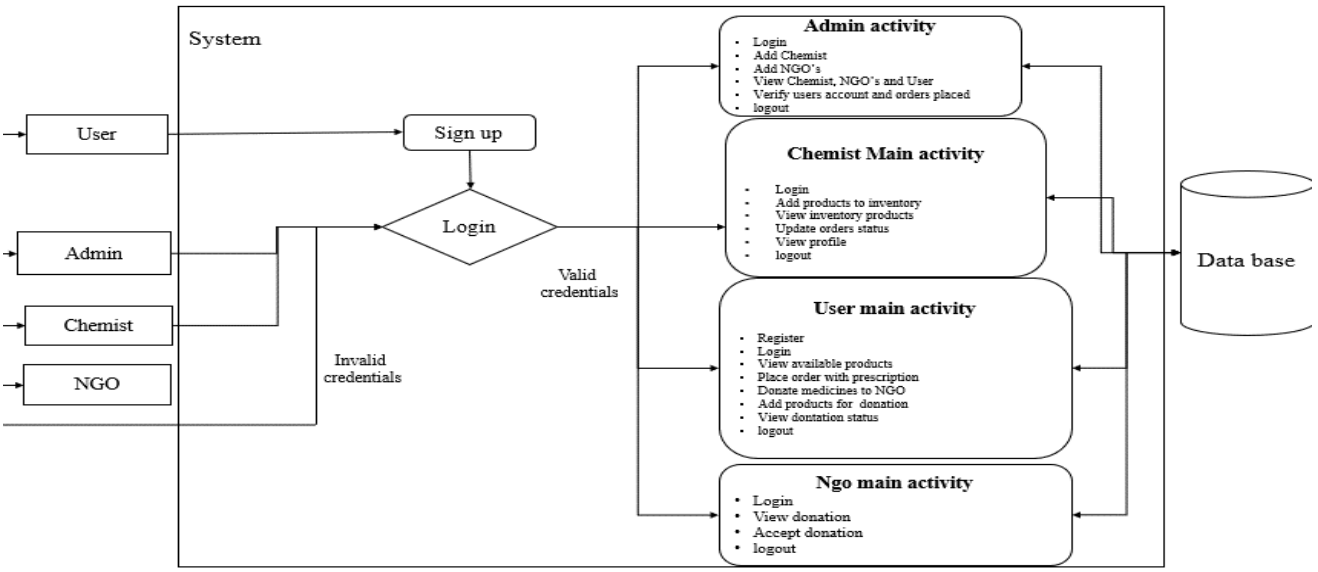
•Plugin - Kotlin

•SDK - Android

•IDE - Android studio

•Database - server script, my SQL

4.4 Architecture



Chapter 5: System Design

5. SYSTEM DESIGN

5.1 Input design introduction

INPUT DESIGN

1. Input Design: Input design is the process of transforming user-oriented requirements into an effective system for data entry. It is a critical component in ensuring accurate data collection and preventing errors during the input phase. Proper input design guides the system users by providing clear instructions and workflows, thus enabling efficient extraction of correct information from the computerized system. With a well-structured input design, human errors can be reduced, and accuracy and meaningful data can be achieved.

2. A good input design to achieve effectiveness is set when it is intuitive, intuitive to use the screens, assists in easy data entry in volumes of information, and makes it simple and free of errors in inputting data. Input screens shall enable users to enter data comfortably with the flexibility of changing or updating the records anytime required. At the same time, these shall also provide some facility for accessing and retrieving all entered data at one's ease for verification and further processing as and when desired.

3. As soon as data is input into the system, the system validates them for correctness and consistency. This process ensures that wrong data does not enter the system, thus keeping the data as a whole consistent and of quality. The interface for inputting data should reflect appropriate error messages or prompts in case invalid input has been detected to assist the user in correcting it quickly without getting confused. Proper instructions or recommendations should be given to aid users in correctly accomplishing their tasks.

4. In addition, the input design also needs to make sure the layout is coherent and easy to use, so that it does not consume much effort of the user but is friendly to use. The user interface should be presented coherently and structured in order to facilitate the process step by step. Default values or drop menus and auto-fill options should also be applied appropriately to avoid mistakes.

5. Another goal of input design is flexibility and scalability. The system should be able to accommodate the different types of input, such as numeric, textual, or binary, and adapt to the different devices or platforms used for data entry. Accessibility and responsiveness, especially in mobile or remote environments, can also further enhance the user experience.

6. Good input design also considers the human factors aspect, including cognitive load, ergonomics, and minimizing user stress. A well-thought-out design reduces complexity by presenting only the necessary data fields to users at each stage, avoiding information overload, and guiding them towards the right decisions quickly.

In summary, the primary goal of input design is to provide a system which is user-friendly, minimizes errors, and enables easy efficient and accurate data entry. When the input process becomes even more user-friendly and error-proof, the system will provide valuable and reliable information that supports effective decision-making.

OBJECTIVES

Objectives of Input Design:

1. Converting User Input into a Computerized Format:

It aims to translate the user-oriented description of the necessary data into a well-structured and computer-based form. The whole idea is that the input design shall make the entire process of inputs easier, resulting in fewer mistakes and ensuring the system gets exactly what it expects.

A proper input interface keeps the user's guidance in creating accurate information input in line with the aim of the data the system is expecting.

2. Design of User-Friendly Interfaces for Inputting Data:

One of the main objectives of input design is to make data entry easy and simple by using easy-to-navigate, user-friendly screens. These screens are designed to handle large amounts of data while maintaining clarity and usability. The design should ensure that users can input data efficiently without confusion or errors. The layout should be intuitive, allowing users to perform data-related tasks, such as entry, editing, and viewing records, with ease.

3. Validate the Entry Data:

Data is validated at input entry through validation mechanisms as part of input design to ensure that the data entered is accurate and correct in form. Additionally, the system should offer relevant messages that inform the user what is wrong while inputting it in real-time so that he or she could minimize confusion that may be present during the whole input process.

4. Error Prevention and Correction Mechanisms:

A primary goal of input design is to minimize errors through the automatic detection and correction of errors. The system, by pointing out and indicating mistakes as they are made, immediately feeds back to the user. This minimizes the chance of wrong data entering the system and enables users to rapidly identify and correct any problems that arise, which further increases the accuracy and efficiency of the system.

5. Data Entry Speed Optimization:

The input design focuses on making the process of data entry as efficient as possible. For example, a large amount of data can be input in a relatively short period. Pre-filled default values, auto-completion, and shortcuts allow users to quickly enter information without losing precision. Input forms structured in a user-friendly manner facilitate rapid navigation between fields, which results in higher productivity and makes the system more efficient for daily use.

6. Data Entry Consistency and Standardization

Another important objective is to ensure consistency in all data entry screens. Users can use the system without much struggle only if they can dependably follow consistent terms used, fields for inputting, and layout. Harmonization also plays a significant role in the ease with which controls such as check-boxes, radio buttons, and drop-down lists would blend into one another, hence ensuring that users do not use distinct conventions for features on every screen.

7. Supporting Various Input Formats and Data Types:

Input design must accommodate all kinds of data, including text, numbers, dates, and other specialized data formats. The system should be able to accept all these kinds of inputs, whether it is a numeric value, date, or alphanumeric string while making sure the data is inputted in the right format and not inaccurately. This flexibility helps to support all the wide input requirements and ensure that the system is versatile enough for different applications.

8. Accessibility for All Users:

The input design should be accessible and usable by all users, including those with disabilities. This would include supporting screen readers, keyboard navigation, and high-contrast color schemes. By ensuring that the system is usable by people with diverse needs, the design ensures that everyone can access and enter data without barriers.

9. Real-Time Feedback and Guidance:

One of the key objectives of input design is to provide instant feedback to the user as the data is entered. The nature of the feedback can be an error message, confirmation, or suggestion to direct the user on how to complete the inputting process. Through this, it reduces confusion while maintaining the integrity of the data by making users aware of any mistakes or requirements in a given field.

10. Ensuring Data Integrity and Completeness:

Input design aims to ensure that all the required data is captured in its entirety. Features such as mandatory fields, field-specific validation rules, and input prompts help ensure that no essential information is omitted. This not only improves the quality of the data entered but also minimizes the risk of incomplete or inaccurate records that could affect system performance and decision-making.

11. User Customization and Preferences:

It is a flexible input design enabling users to make choices in some customized aspects of data entry. This may involve default formats for the date and time, selectable form layouts, and the language in which they work. Increasingly, customization boosts user satisfaction and makes the system more friendly to a variety of user's needs and preferences.

12. Data Security and Privacy Ensured:

Input design should also be secure and private, especially when sensitive information is being input. The system should include masked input fields for passwords or credit card information, encrypt during transmission, and other security protocols to prevent unauthorized access to user data.

Thus, input design becomes essential to achieve the above goals and objectives so that the data coming into a system is accurate, consistent, secure, and usable, making the experience of coming into a system even better and efficient.

OUTPUT DESIGN

A good output should not only satisfy the end user's needs but also present information in a clear and understandable manner. In any system, the results of processing must be effectively communicated to users and, if necessary, to other systems. Output design is important as it determines how information is to be presented both for immediate use on the screen and in the form of hard copies. Since output is the primary mode of communication for information

to be passed to the user, it is through the design of output that the interaction with and understanding of the system become significantly affected. A well-planned and effective output design enhances the usability of the system, thus making better decisions for users by providing the relevant information in an understandable and meaningful way.

1. Structured and Planned Output Design: Computer output design must always be done in a structured and planned manner. One should make sure that each portion of the output is created effectively so that all users can extract and utilize easily the information which they receive in the output generated. Analysis helps in the definition of what will be required at the output in order to ensure the fulfillment of the user requirements. These outputs have to be appropriate for the correct needs and context of the end-user, thereby rendering them with appropriate, actionable data.

2. Selecting the appropriate method of presenting: how one presents information forms a significant output design element. The method which one should opt for displaying the output on the screen, printing on paper, or transmitting the output through some other media, should be in relation to the nature of information, the needs of the users, and the context of output utilization. The choice would then rely on that output format that suits one's type of data, thus aligning with the purpose of intended use.

3. **Creating Documents or Reports:** Once the presentation method is chosen, it is important to create documents, reports, or other formats that will effectively communicate the system-generated information. These outputs should be easy to interpret, well-organized, and contain all the relevant data without being overwhelming or confusing. The goal is to ensure that users can quickly find the information they need and make decisions based on it.

- The output delivered by an information system must fulfill multiple purposes, depending on the kind of system and the needs of the user. The following objectives should be taken into account when designing the output:

- ❖ Outputs should inform about past, current, or future states. They must provide the most important information regarding past activities, current status, or projections into the future. This may include performance data, financial summaries, or forecasts to help users understand trends or make predictions.

- ❖ Alert the attention of users for events or issues that concern them: Outputs should contain alerts for significant events, opportunities, problems, or warnings for immediate attention. For instance, some system alerts, or critical conditions may require timely intervention or decisions.

- Trigger Action: In certain cases, an output triggers the execution of an action. For example, a report might bring into attention a key problem and induce the user to start a remedial action in response, perhaps by investigating some discrepancy or preventive measures.

- Confirmation of Actions: Outputs can also confirm that an action has indeed been carried out. For example, after making a request or after conducting a transaction, the confirmation output tells users that their actions have been processed and informs them about any other information relevant to their requests, such as transaction numbers or receipts.

Effective output design plays a very basic role in ensuring that information systems produce information that is valuable, actionable, and timely to the user. Clarity, relevance, and usability are thus priorities of the design in ensuring that the output supports the user's decision-making process and improves the system experience as a whole. This means the presentation methods, formats, and purposes of the output have to be considered with utmost care in optimizing the system for the user's needs.

5.2 UML Diagram

UML stands for Unified Modeling Language, and it is standardized general-purpose language used in object-oriented software engineering. It has been developed by the Object

Management Group and they maintain it also. The main idea of UML is to find a common language for the model of object-oriented software systems. Two key components in the current definition of UML are a meta-model and a notation. Eventually, a method or process is also expected in the future.

UML is part of object-oriented software development; it has critical importance in the whole life cycle of a software product. It primarily depends on graphical expressions to present a design of projects for software. Using this approach provides clearer communication between developers and also streamlines the process.

GOALS:

The key objectives of UML are:

1. Express a Visual Modeling Language: It offers an expressive, ready-to-use visual language to create meaningful models for discussion among developers and stakeholders, for clarity.

2. Support Extendibility: It facilitates extension and specialization of its basic concepts for unique requirements and to cater to diversified development environments.

3. Independence from Programming Languages and Processes: UML is designed to be independent of programming languages and development processes, thus applicable to different platforms and methodologies.

4.Formal Foundation for Understanding: UML provides a formal structure, thus ensuring consistency and clarity in its application for effective use.

5. Encourage OO Tools Market -UML stimulates the growth of object-oriented tool markets by stabilizing modeling techniques, thus enhancing interoperable tools to a great extent.

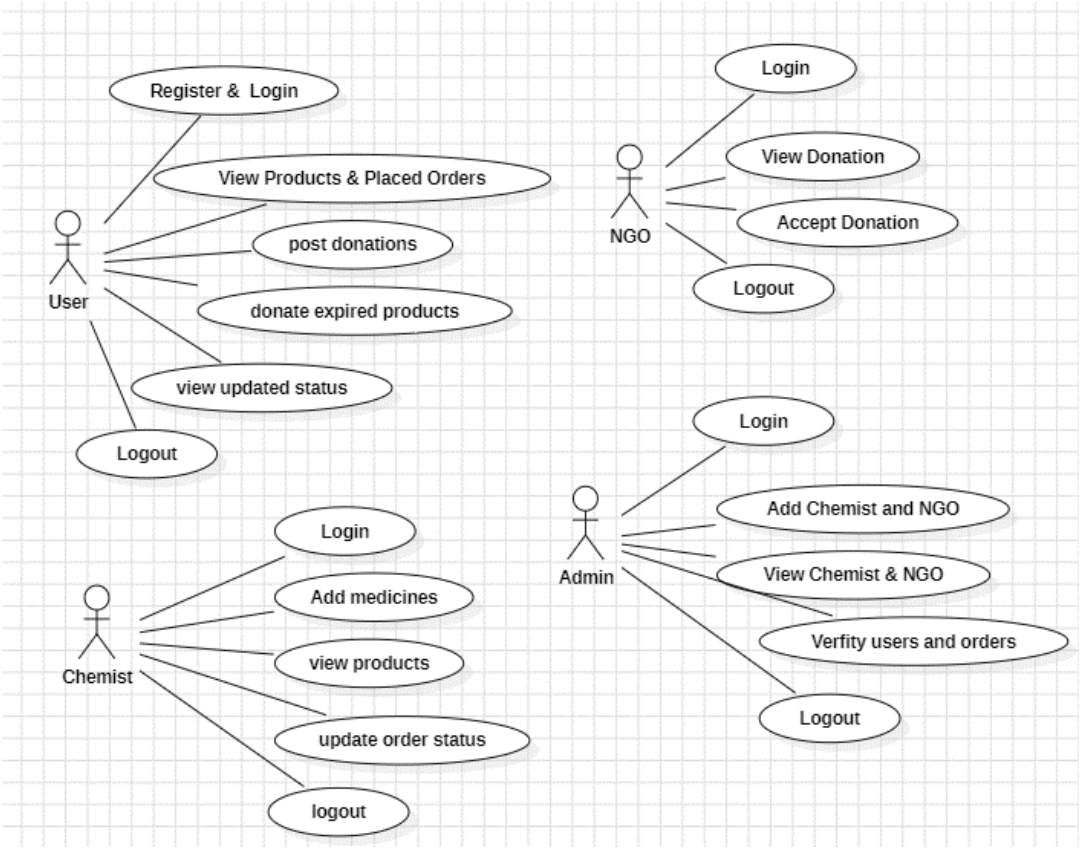
6. Promote Refined Development Models-UML features include collaborations, frameworks, and patterns, with scalability and maintenance during software development.

7. Merging Good Practice-UML consists of practical knowledge in engineering practice, quality improvement, and overall success rates for software developments.

In other words, UML is meant to be an adaptable and holistic tool that enables effective, object-oriented software development and promotes cooperation across different environments.

USE CASE DIAGRAM:

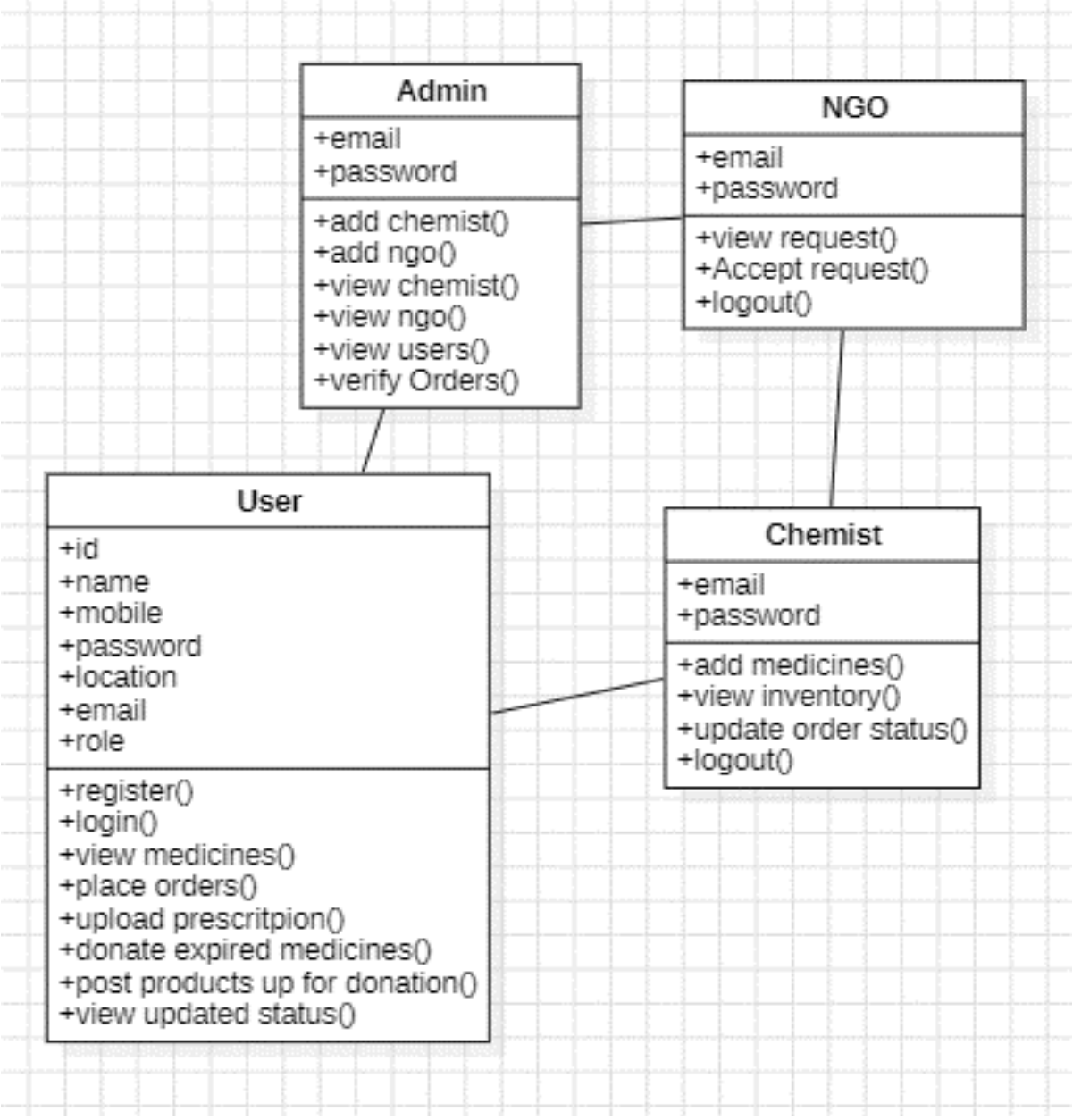
A use case diagram in Unified Modelling Language is derived from the analysis of a use case. It shows the behaviour of a system with the help of actors and the goals as use cases. Here, use case diagrams mainly exhibit which functions are executed in a system for a specific actor. At the same time, the actor's roles in a system are represented.



CLASS DIAGRAM:

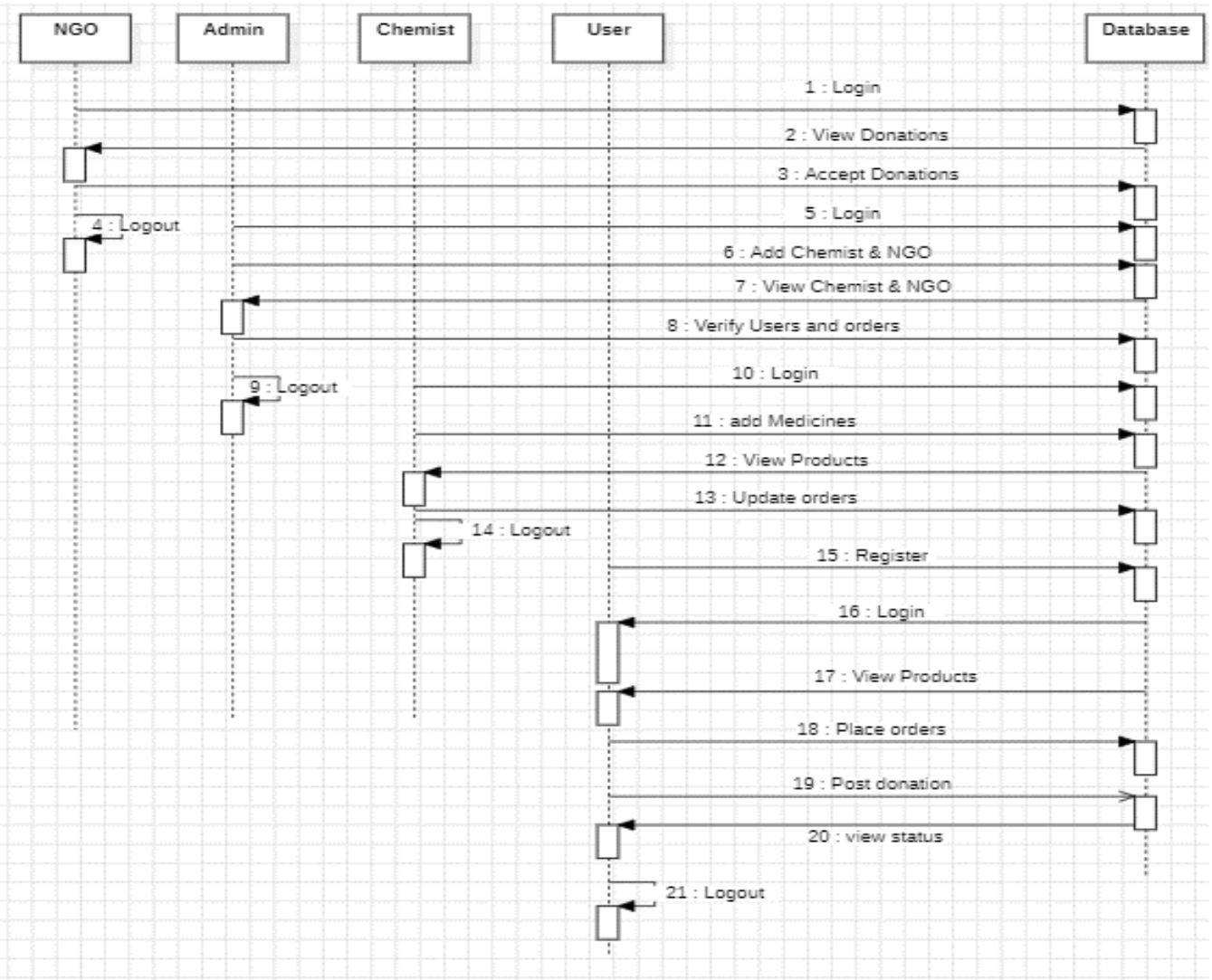
A class diagram is a static structural diagram in Unified Modelling Language (UML) and represents classes and their attributes, methods, and relationships inside a system. This is the blueprint of the architecture of the system.

Class diagrams are important in the design and understanding of a system's structure; they help the developer to see how classes interrelate, and thus, guide the development process in object-oriented programming.



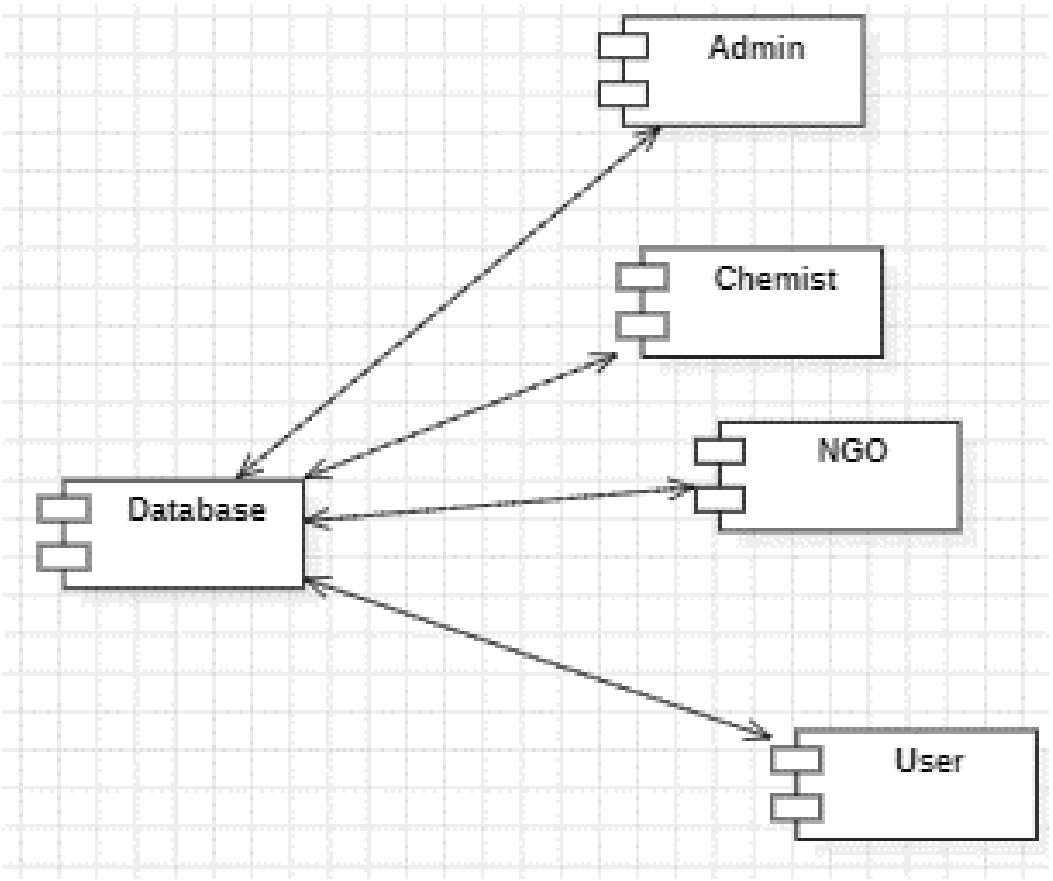
SEQUENCE DIAGRAM:

A sequence diagram in Unified Modelling Language is an interaction diagram showing how processes or objects interact with each other over time. It shows the sequence of messages exchanged between participants and the order in which they occur. Sequence diagrams are also referred to as event diagrams, event scenarios, or timing diagrams.

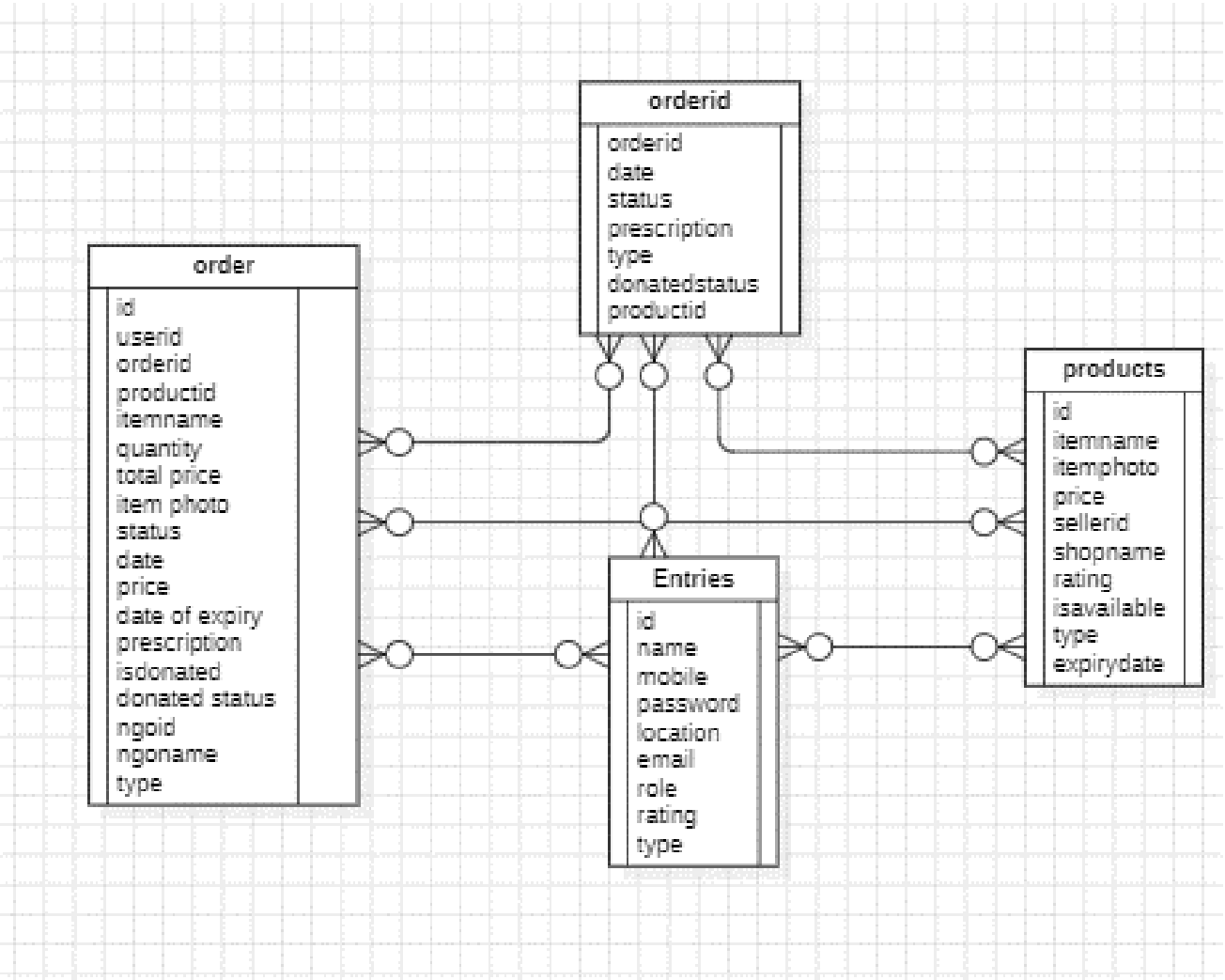


ACTIVITY DIAGRAM:

An activity diagram shows the overall flow of control . Activity diagrams in Unified Modeling Language (UML) represent graphical workflow-oriented representations of stepwise activities and actions. They support all kinds of elements such as choice, iteration, and concurrency. These diagrams are useful in describing business processes, operational workflows, as well as step-by-step functioning of the system components. They describe the overall flow of control within a system, which also stresses the sequence of activities and decisions involved.



ER DIAGRAM: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Chapter 6: Implementation and Results

IMPLEMENTATION AND RESULTS

6.1 Modules

User Module:

This module is designed to give the user an effortless service from register all the way to transaction completion. The users, after registering, can create a personal account and safely log into the portal with their login credentials after verification. All verified users are given access to their preferred list of medicines and medical equipment available on the platform for purchase and are able to add them to their shopping cart. The module supports the order placement process, thereby allowing users to make purchases. Further, users can engage in philanthropic activities through donation of medicines or medical supplies close to their expiry date or shortly to expire. The User Module allows users to manage their profile where they may view and update their personal details, track their history of donations, and monitor the status of their orders or any donation made.

Admin Module:

This module grants full administrative control over the platform. Thus, all kinds of managerial activities will be in control, ensuring smooth and flawless system functioning. The Adding/Authentication of new NGOs and Chemists will be done by admins, such that only legitimate bodies and professionals come into this network. The module allows administrators to access the detailed user profile, manage the customer orders, and verify and approve donations, as well as medical equipment requests. Admins will be responsible for overseeing the overall functionality of the entire platform in ensuring that all users and organizations comply with the regulations and guidelines. The Admin Module has features for user session management - log out of users, and maintaining overall system integrity against misuse and fraudulent activities.

NGO Module:

The NGO Module is designed for non-governmental organizations to effectively work with the platform on a donation request. Once a user logs into the website, NGOs can go through the lists of donations needed for medicines or medical equipment, and see what they can contribute with their available needs and resources. NGOs may choose to accept or decline donations that they can handle according to the distribution. This module also incorporates an important tracking functionality, where all the NGOs can trace donated drugs and medical equipment from receipt to their distribution. Recording such details in a module will assist the NGOs to ensure that items donated to them are managed in the most efficient way possible, hence reaching the beneficiaries without wastage or delays.

Chemist Module:

The Chemist Module is designed specifically to help chemists manage their business on the website. Upon log-in, chemists can see and manage their profiles, thereby ensuring that the business details of the chemists are updated correctly. Chemists can maintain and update their inventory of products by adding new products, editing already existing listings, and removing out-of-date or unavailable products. They can also monitor and handle customer orders, where order status updates might be based on product availability or shipping progress. The Chemist Module is very instrumental in terms of the correct recording of stock levels for timely fulfillment of orders and informing the customers regarding the availability of products and shipment timelines. This module also facilitates a chemist to adapt fast to changes in demand, optimize inventory, and assure quality services to customers. In summary, each module is User, Admin, NGO, and Chemist, providing different functionalities to meet the diverse needs of the platform. This allows for efficient operation, accurate transactions, and proper management of resources and donations. All these modules are in synchronization with each other so that the system remains user-friendly, secure, and effective in achieving its mission to connect users, NGOs, and chemists meaningfully and productively.

RESULTS:

1. User Module:

- **Effective Registration and Login:** Users can easily register or log in and authenticate themselves safely to access the site.
- **Effortless Browsing and Ordering of Products:** Users can browse available products and place orders with ease in a seamless shopping experience.
- **Donation Management:** Users can donate medicines or medical equipment that are near to expiry or about to expire, contributing to social causes and helping those in need.
- **Personalized Profile Management:** Users can view and update their profile, ensuring their personal information is accurate and up-to-date, while tracking their donation history and order statuses.

2. Admin Module:

- **Admin Control Over Access of Users and Organizations:** The new users, NGOs, and chemists would be managed and authenticated by admins so that only authorized users go into the system.
- **Verification of Orders and Donations:** Admins would monitor and verify orders and donations, ensuring transparency and accuracy in the system.
- **System Integrity and Oversight:** The admins are responsible for maintaining the overall integrity of the system, preventing misuse, and managing user logins and logouts to ensure security.
- **Efficient Management of the Platform:** The admin can oversee all platform activities, ensuring smooth operations and compliance with the platform's guidelines.

3. NGO Module:

- **Management of Donation Requests for Medicines and Medical Equipment:** NGOs can view and accept or reject donation requests for medicines and medical equipment according to their capacity and needs.
- **Tracking of Resources:** NGOs can track the donated items, ensuring proper inventory management and distribution of medicines and equipment.
- **Resource Distribution:** NGO's are strengthened to manage resources donated to it in a

much more efficient manner thereby providing better service to the recipients and less waste.

- **Recording:** Detailed record of donated articles helps NGOs properly allocate and account for resources

4. Chemist Module:

- **Inventory Management:** Chemists can manage and update their inventory by adding new products and modifying existing ones to ensure their listings are accurate.
- **Order Fulfillment and Tracking:** Chemists can view and manage customer orders, thereby giving timely updates on product availability and shipping statuses.
- **Optimized Stock Management:** Chemists know real-time stock levels, which ensures that the customers' demand gets delivered promptly.
- **Improved Customer Service:** With product listings and order statuses, a chemist will be able to update the customers, thus improving overall customer experience.

In General:

- Smooth running of operations. There is a synergy of all modules to work appropriately for the users, NGOs, chemists, and admins.

Increased transparency and impact on donation process : The process of donating is very transparent, which enhances better management of resources, leading to higher social impact.

Better resource management for chemists, NGOs, and users : Medicine and medical supply delivery to areas in need will be improved with proper management of the chemists', NGOs', and users' resources.

- Improved User Experience: Users get an easy-to-navigate platform with secure transactions, personalized profiles, and the ability to donate or place orders seamlessly.

RESULTS OBTAINED:

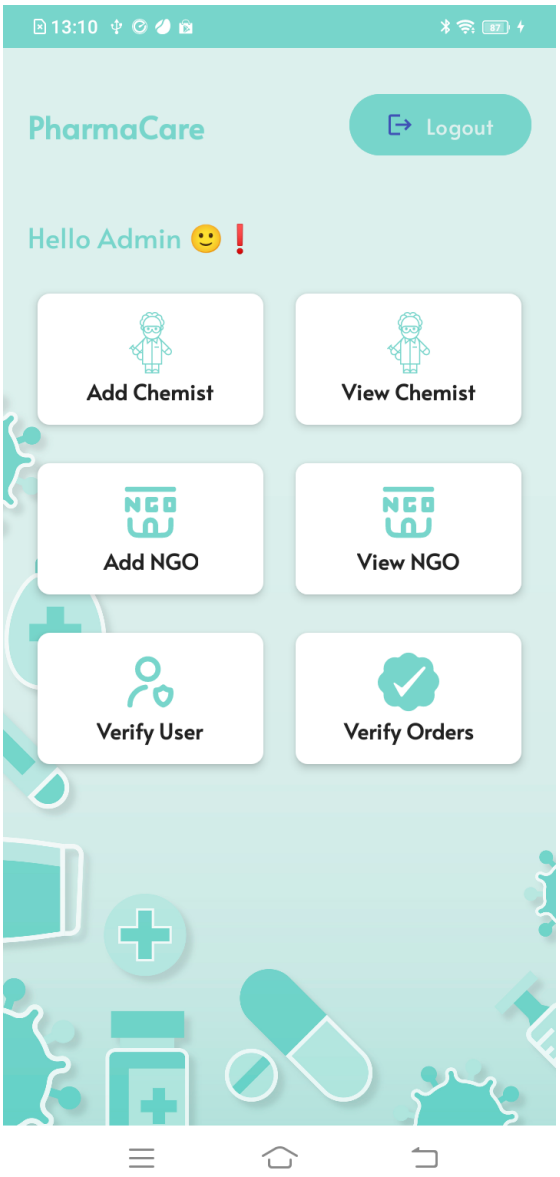


Figure 1 All modules can login using this page

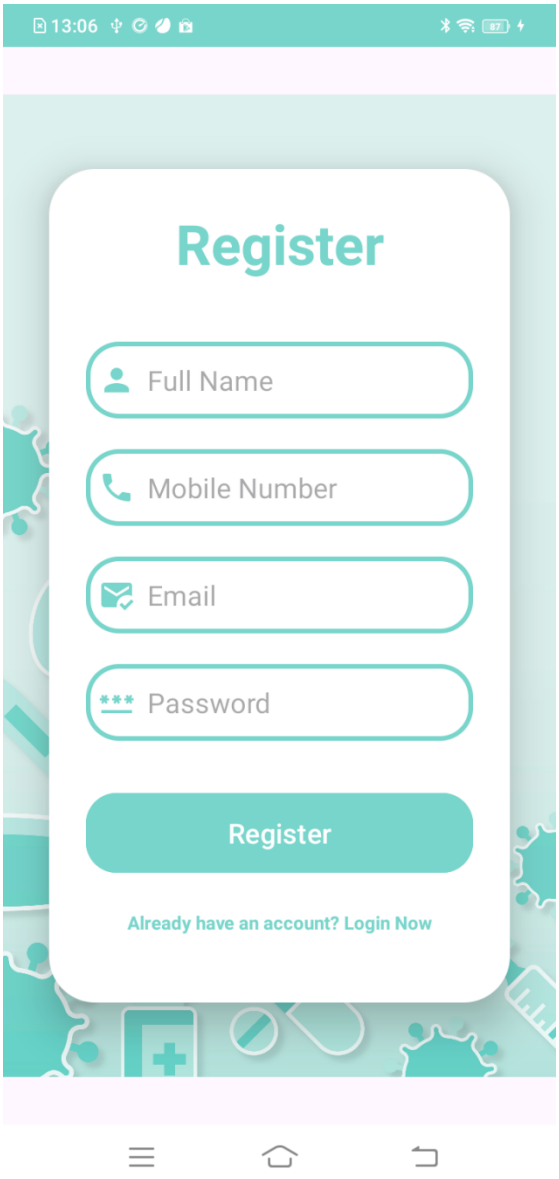


Figure 2 User will be able to register here for login

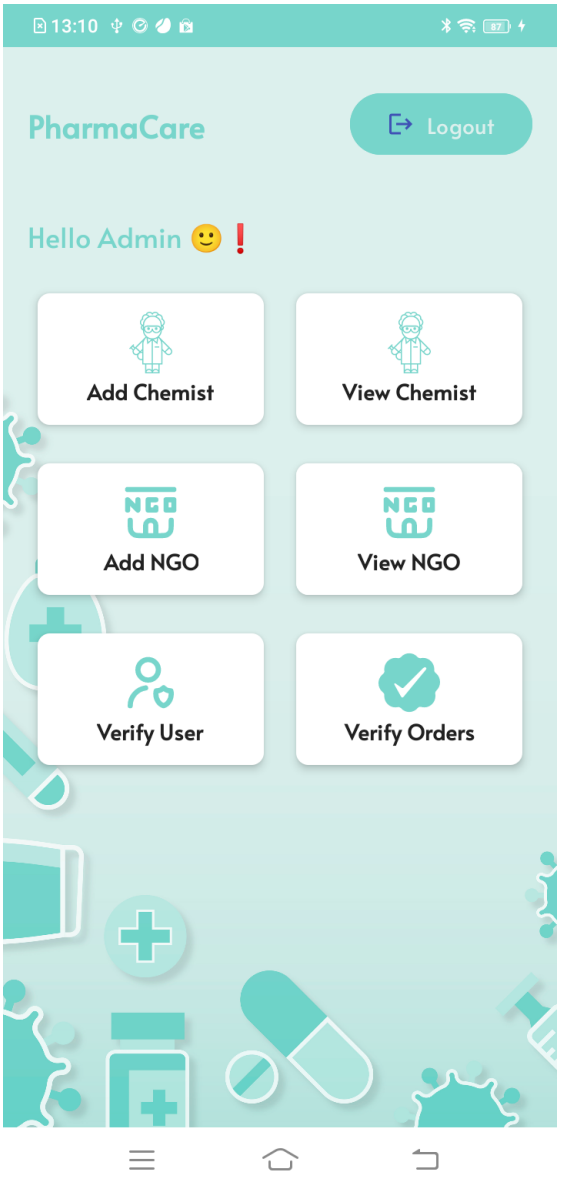


Figure 3 Admin will be directed here after successful login

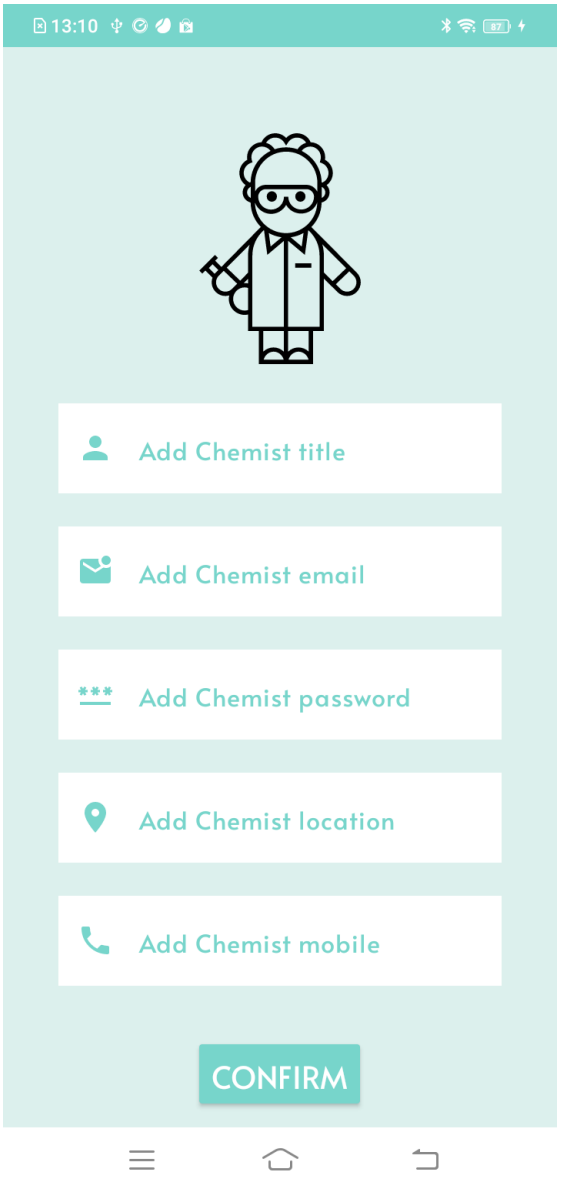


Figure 4 Admin will be able to add chemist here

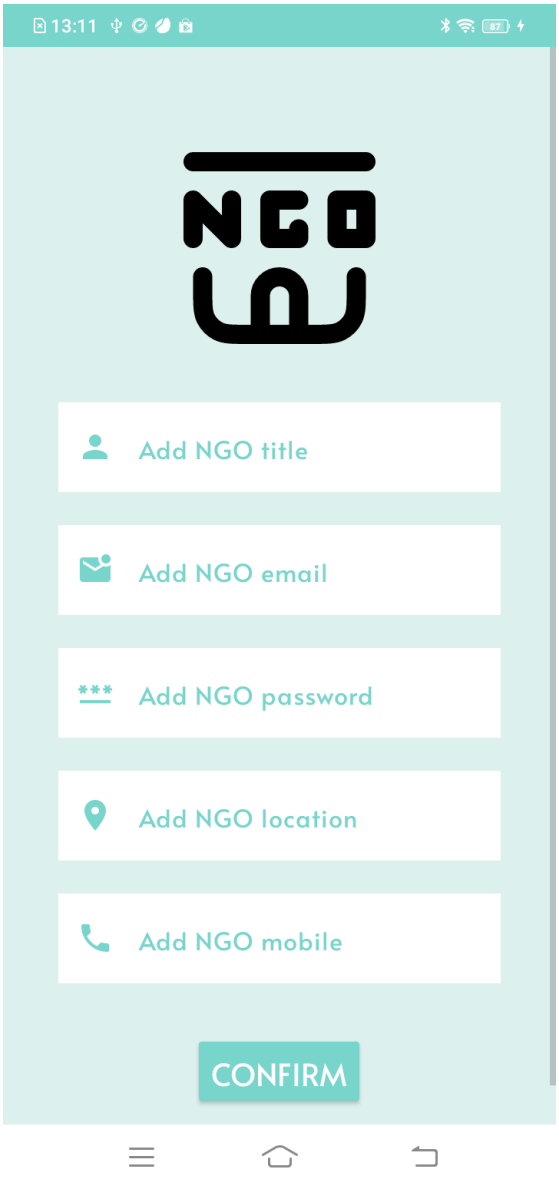


Figure 5 Admin will be able to add the NGO's

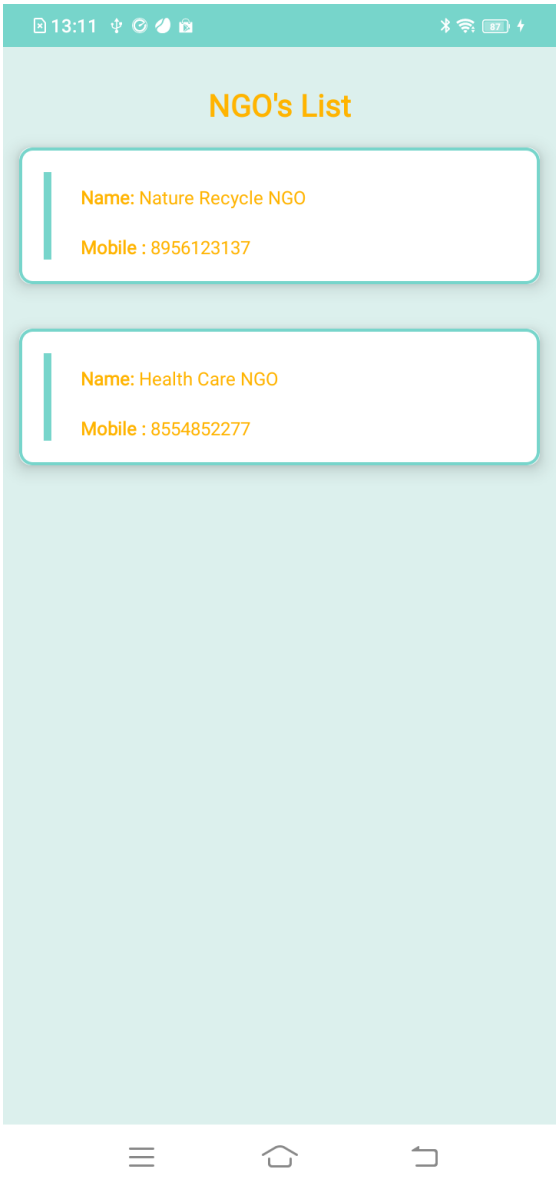


Figure 6 Admin will be able to view NGOo list here

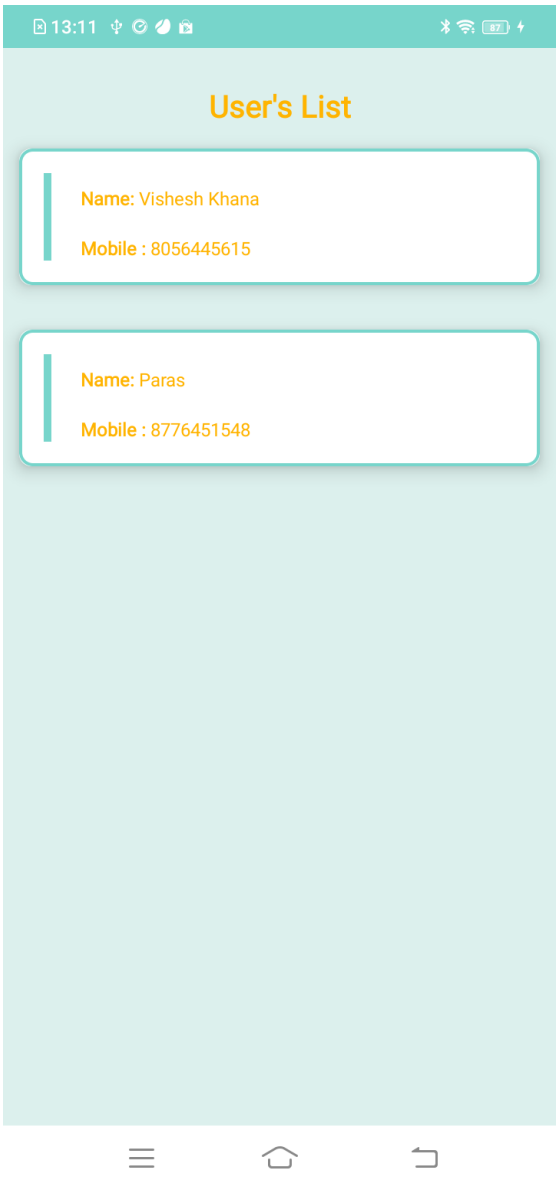


Figure 7 Admin will be able to verify user here.

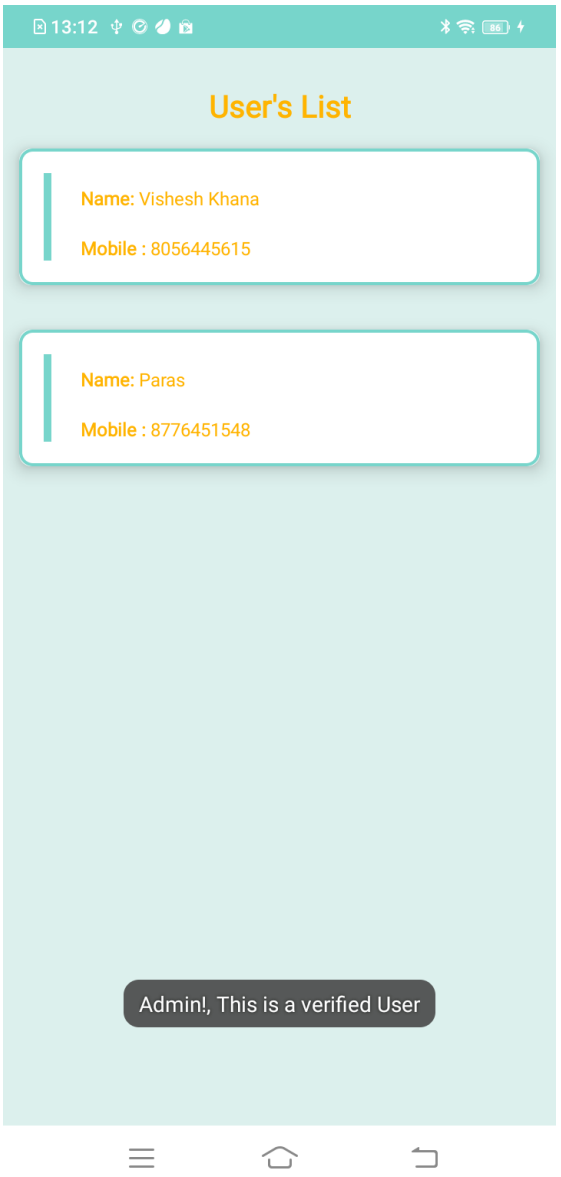


Figure 8 Admin will get a toast message if user is already verified

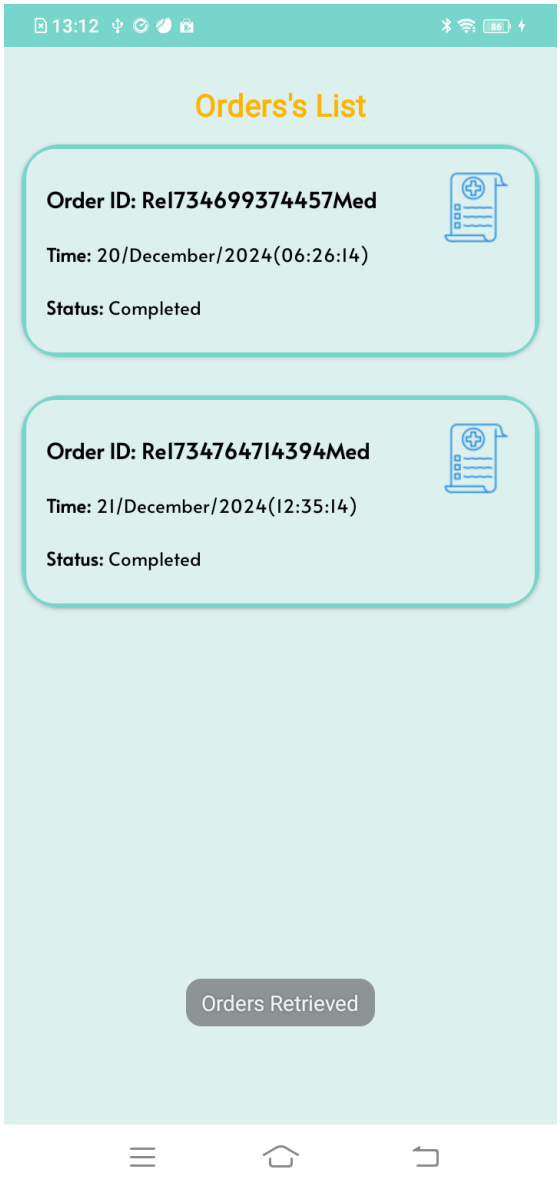


Figure 9 Admin will the orders here and verify them

Figure 10 Admin can view the prescription for verification

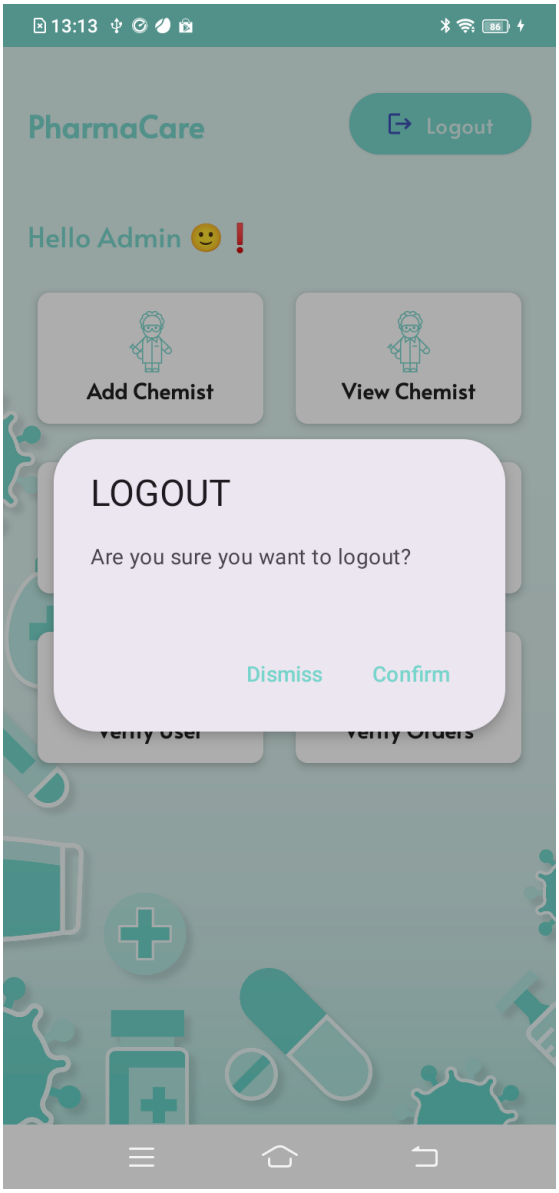


Figure 11 Admin will be able to logout here

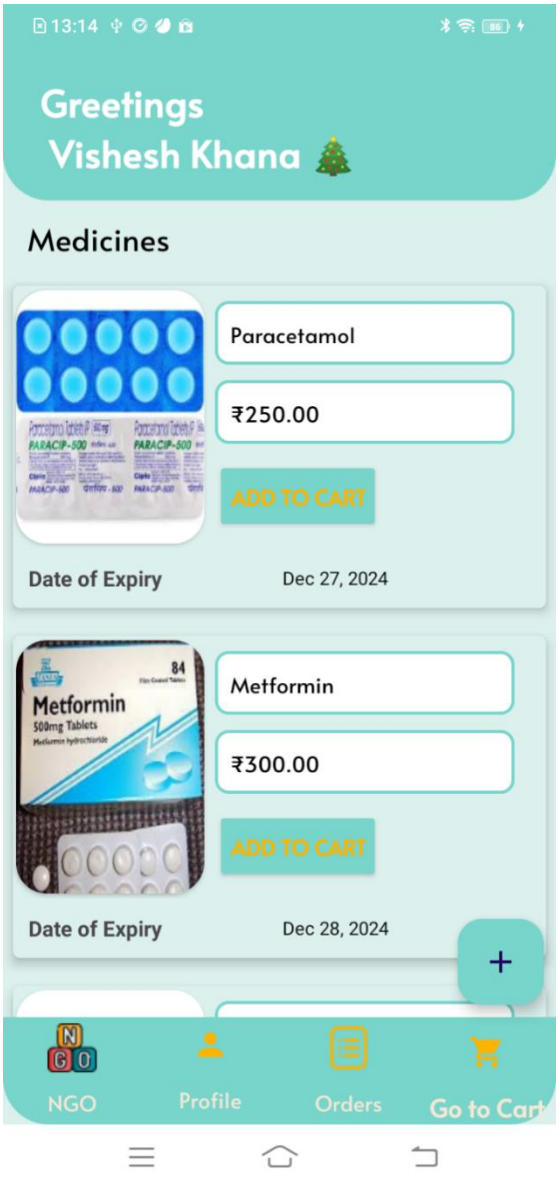
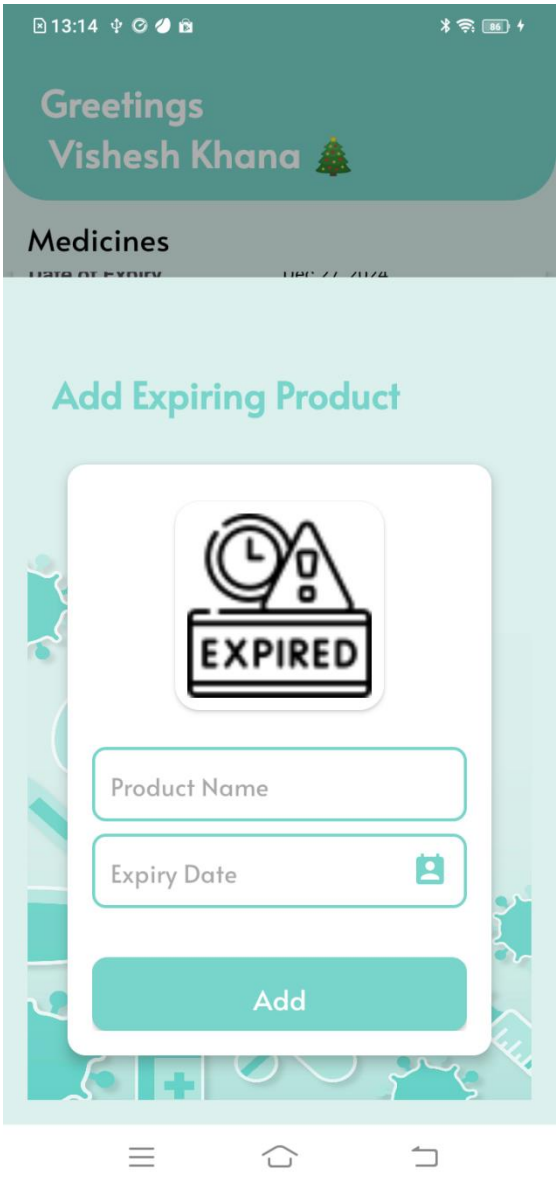


Figure 12 User will be directed here after successful login



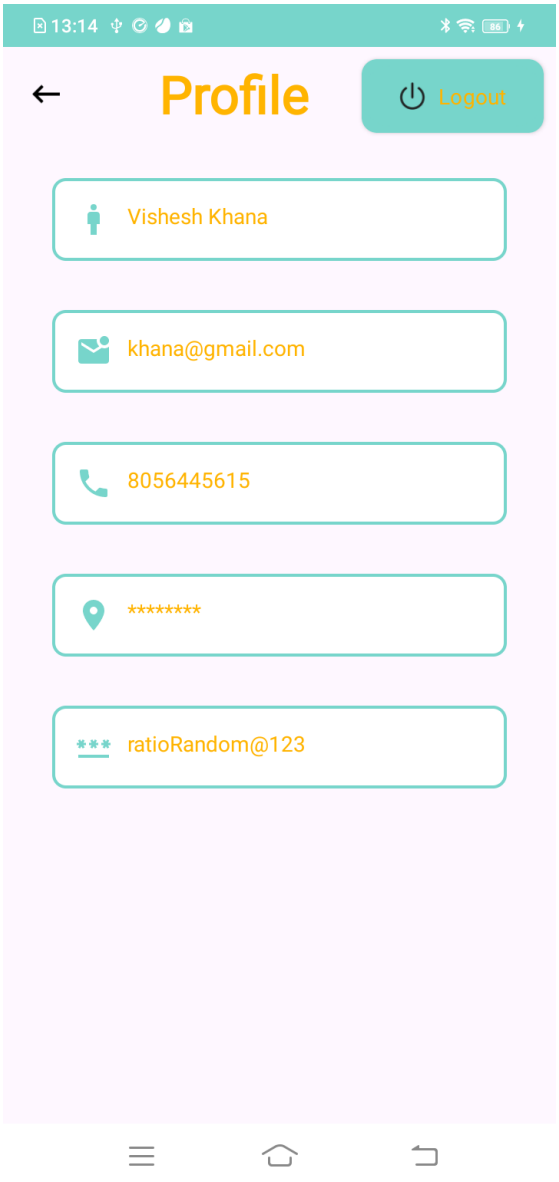


Figure 13 User will able post expired or unused product here for donation

Figure 14 User will be able to logout here

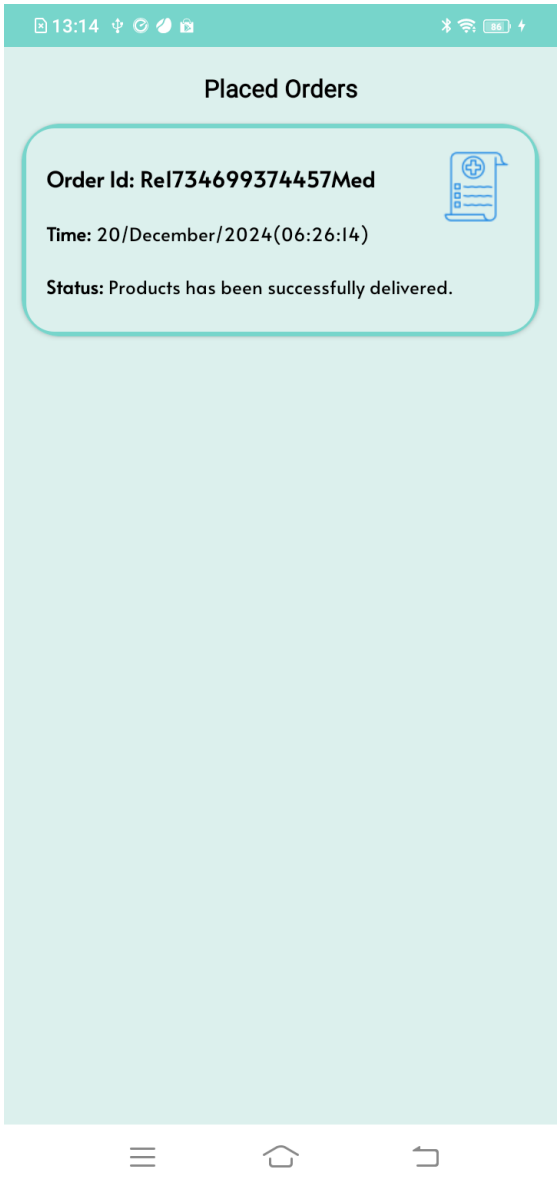


Figure 15 User will be able to view the placed orders here

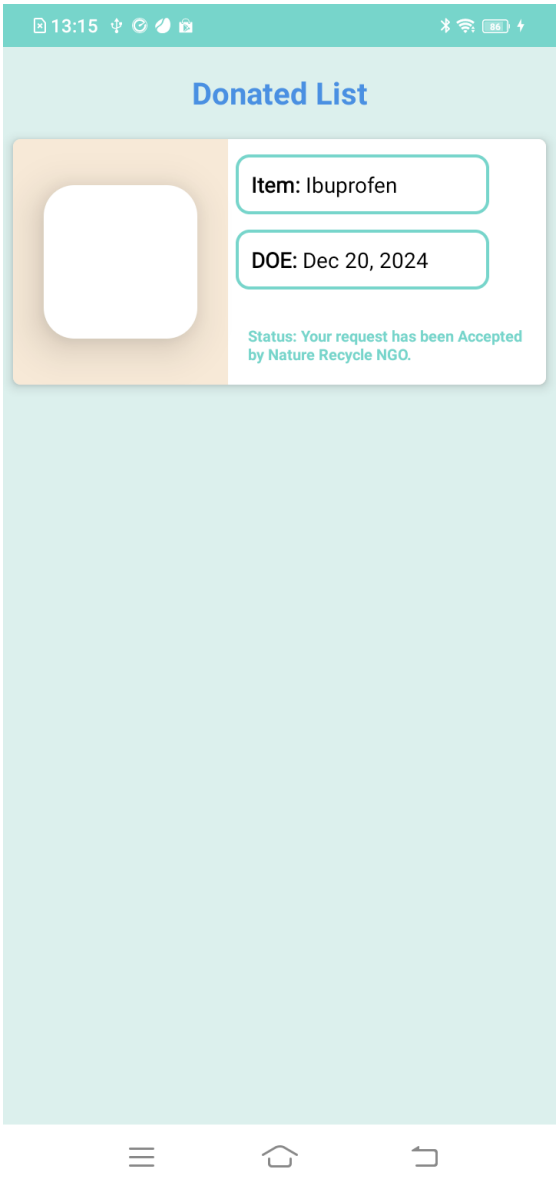


Figure 16 User will be able to view the posted donations here

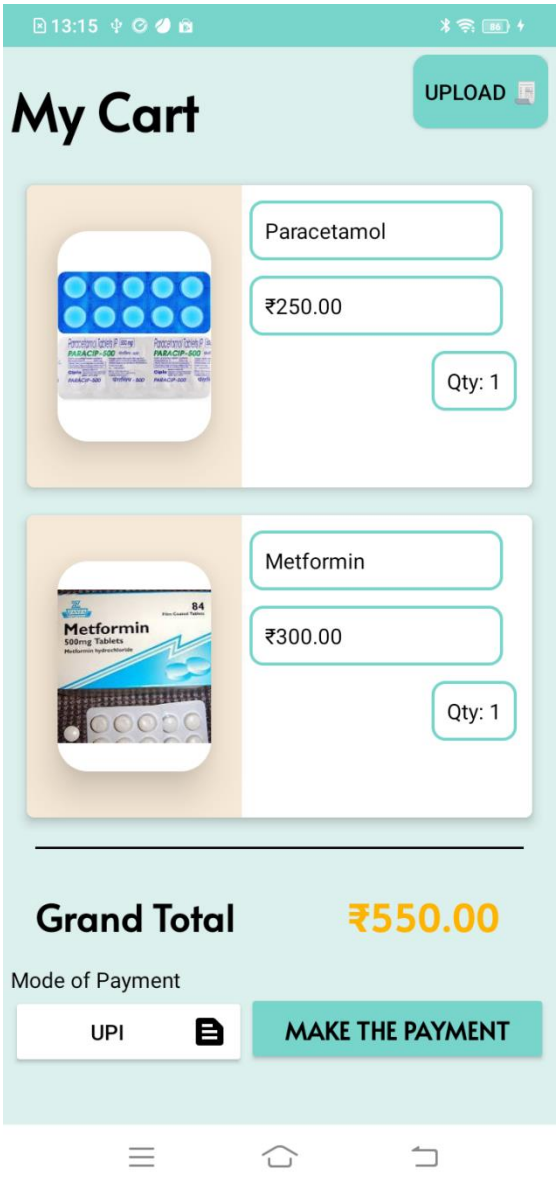


Figure 17 User cart activity where he can place the order

Figure 18 User will be able to see ordered products here

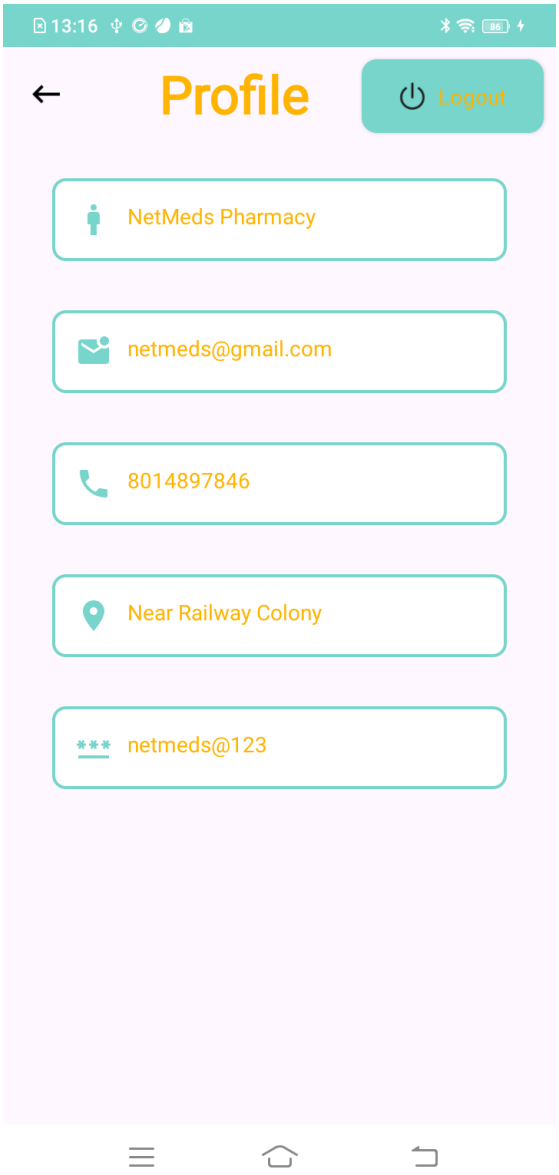


Figure 19 Pharmacy can view their profile

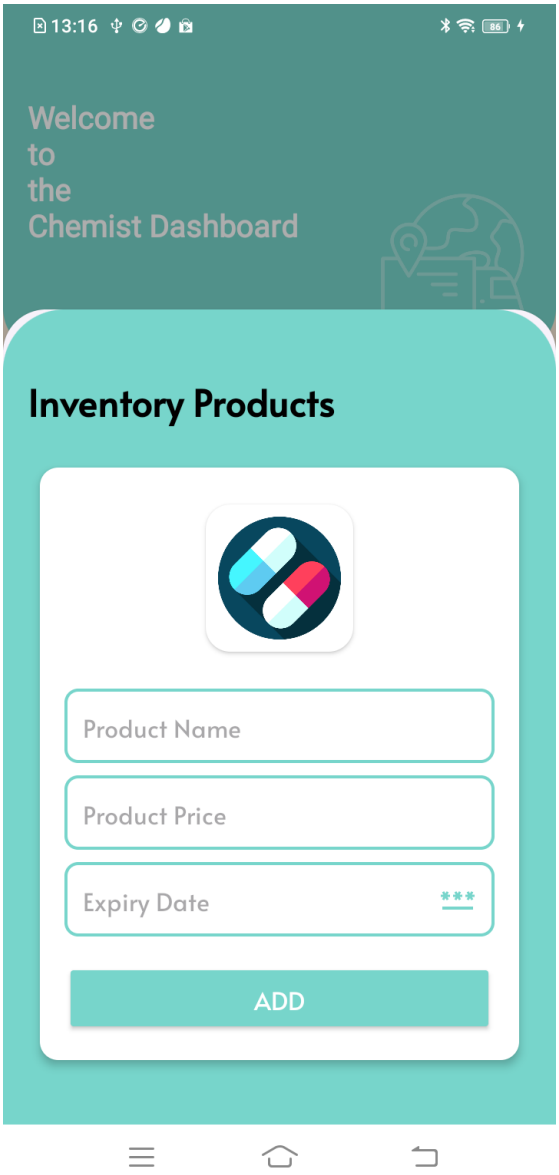


Figure 20 Chemist can add the products here

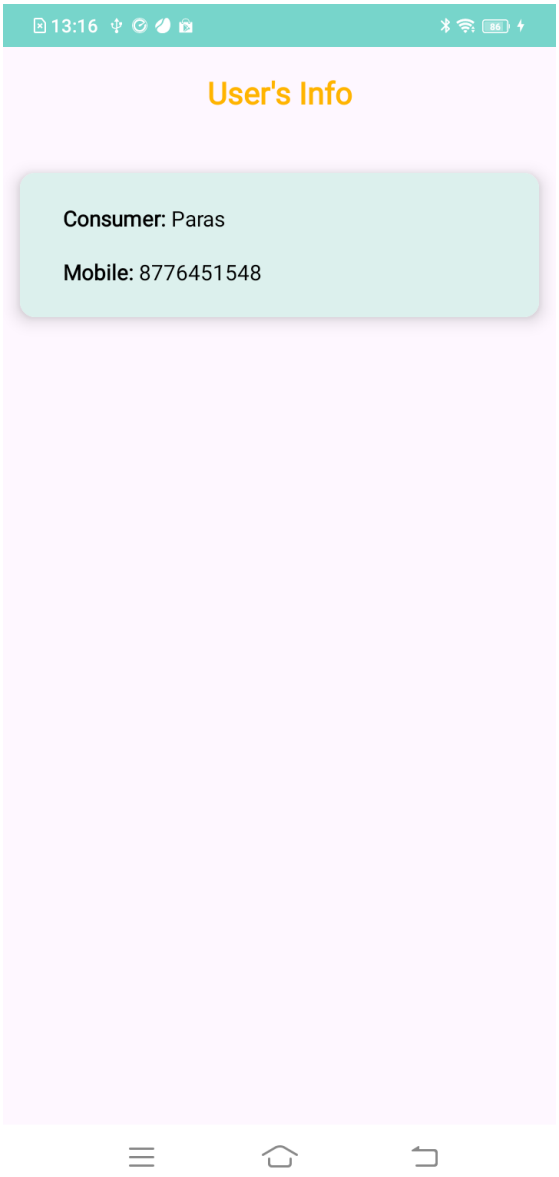


Figure 21 Chemist can also view the user's info here

Figure 22 Chemist can view the orders here

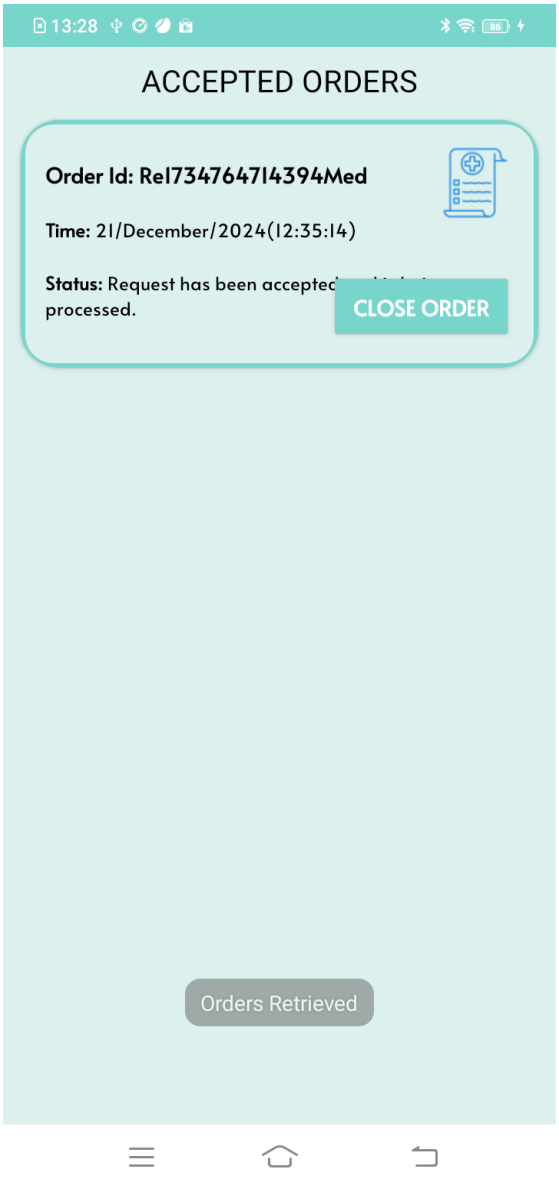


Figure 23 Chemist can view the accepted orders here

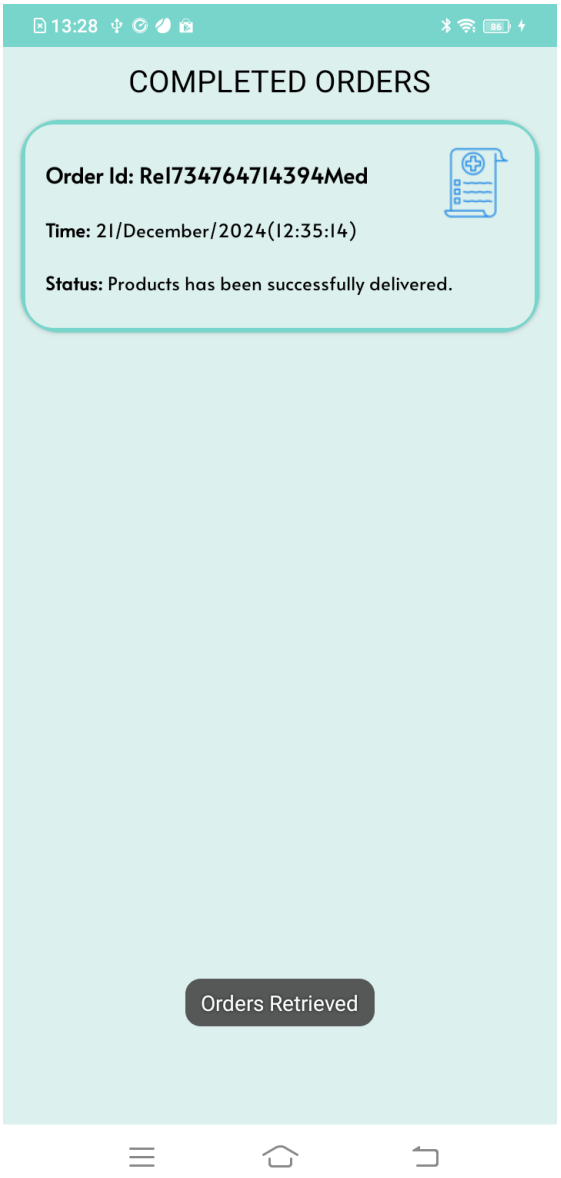


Figure 24 Chemist can view the completed orders

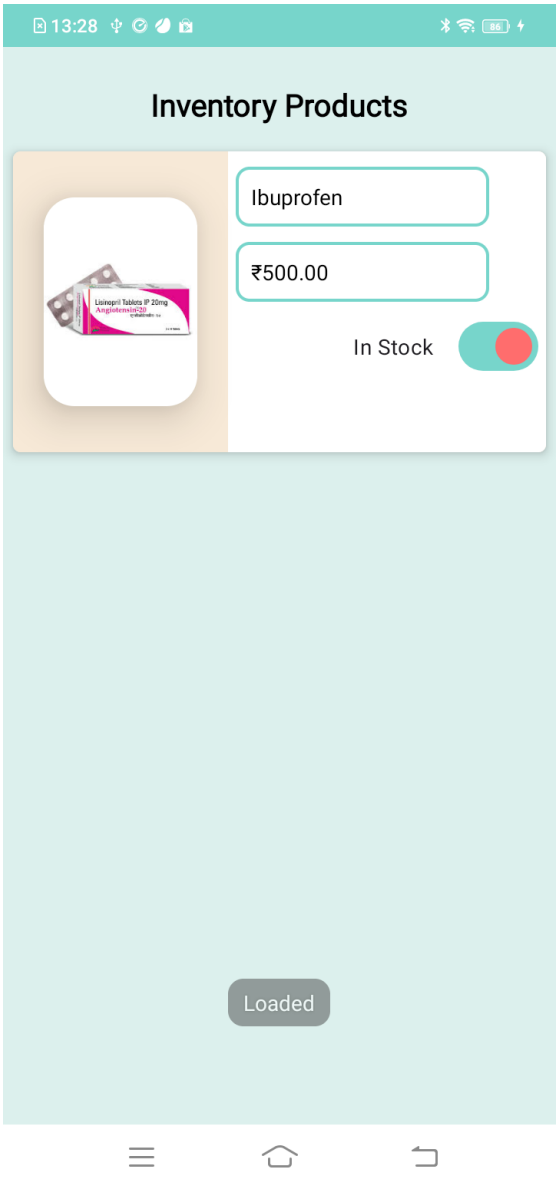


Figure 25 User can view the inventory products here

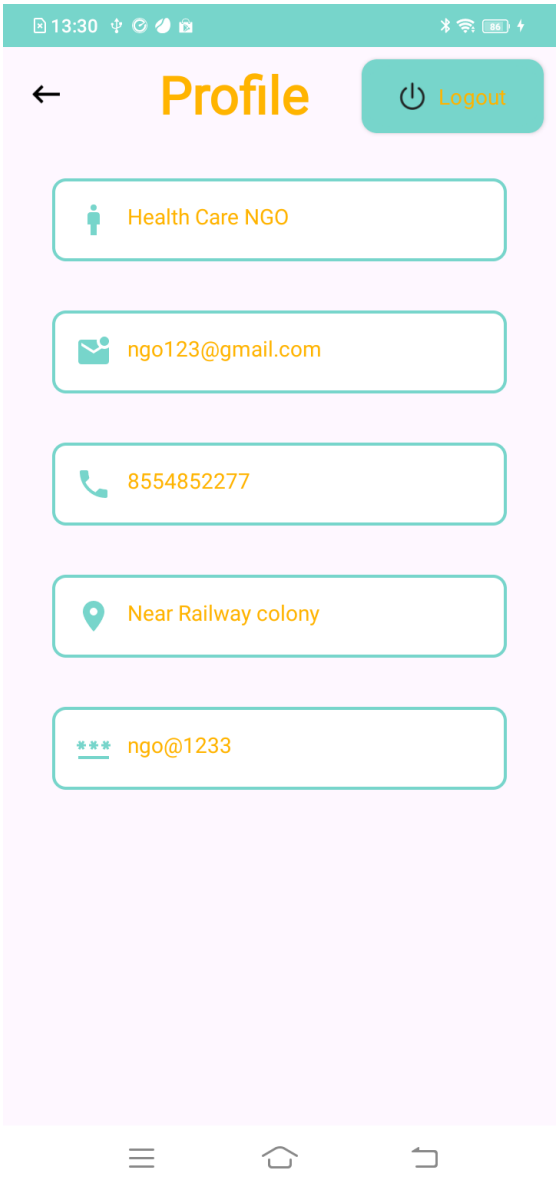
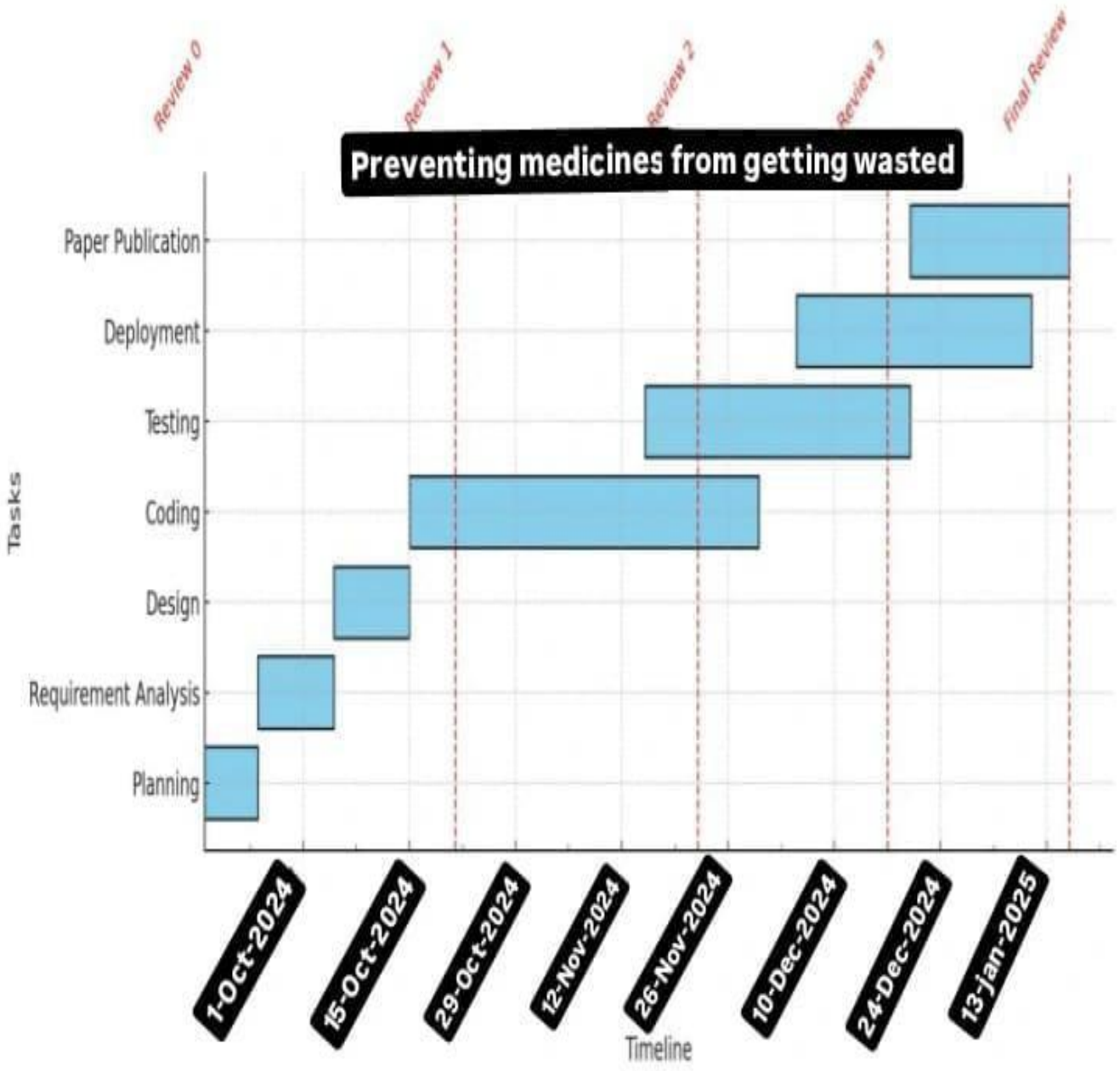


Figure 26 NGO can view the profile here

Figure 27 Accepted orders can be viewed here

TIME LINE:


Review 0
Review 1
Review 2
Review 3
Final Review
Preventing medicines from getting wasted
Paper Publication
Deployment
Testing
Coding
Design
Requirement Analysis
Planning
Tasks
1-Oct-2024
15-Oct-2024
29-Oct-2024
12-Nov-2024
26-Nov-2024
10-Dec-2024
24-Dec-2024
13-Jan-2025
Timeline

Chapter 7: ANDROID ENVIRONMENT

7.1 SOFTWARE DEVELOPMENT LIFE CYCLE

Agile refers to flexibility and adaptability, and the "Agile process model" is an approach to software development that emphasizes iterative progress and continuous improvement. In Agile, work is broken down into small, manageable segments, and tasks are divided into shorter iterations. Unlike traditional methods that rely on long-term planning, Agile focuses on developing small increments of the product with short-term objectives. In this methodology, the scope and requirements of the project are defined at the very beginning, with clear plans being made for the number of iterations, their duration, and the objectives to be achieved. The risks are thereby mitigated, since the project will deliver smaller parts on time and give quicker feedback in case one needs to adjust the direction of the project. Each iteration is considered a full cycle of the software development process, with stages such as planning, requirements analysis, design, coding, and testing. After testing, the team delivers a fully functional product increment to the client. This continuous delivery model ensures that the client will have working software at regular intervals, making it easier to track progress and make adjustments early in the development life cycle.

The Agile development process combines both iterative and incremental approaches, allowing for greater flexibility in managing changes and responding to new information throughout the project. The typical steps involved in the Agile Software Development Life Cycle (SDLC) include:

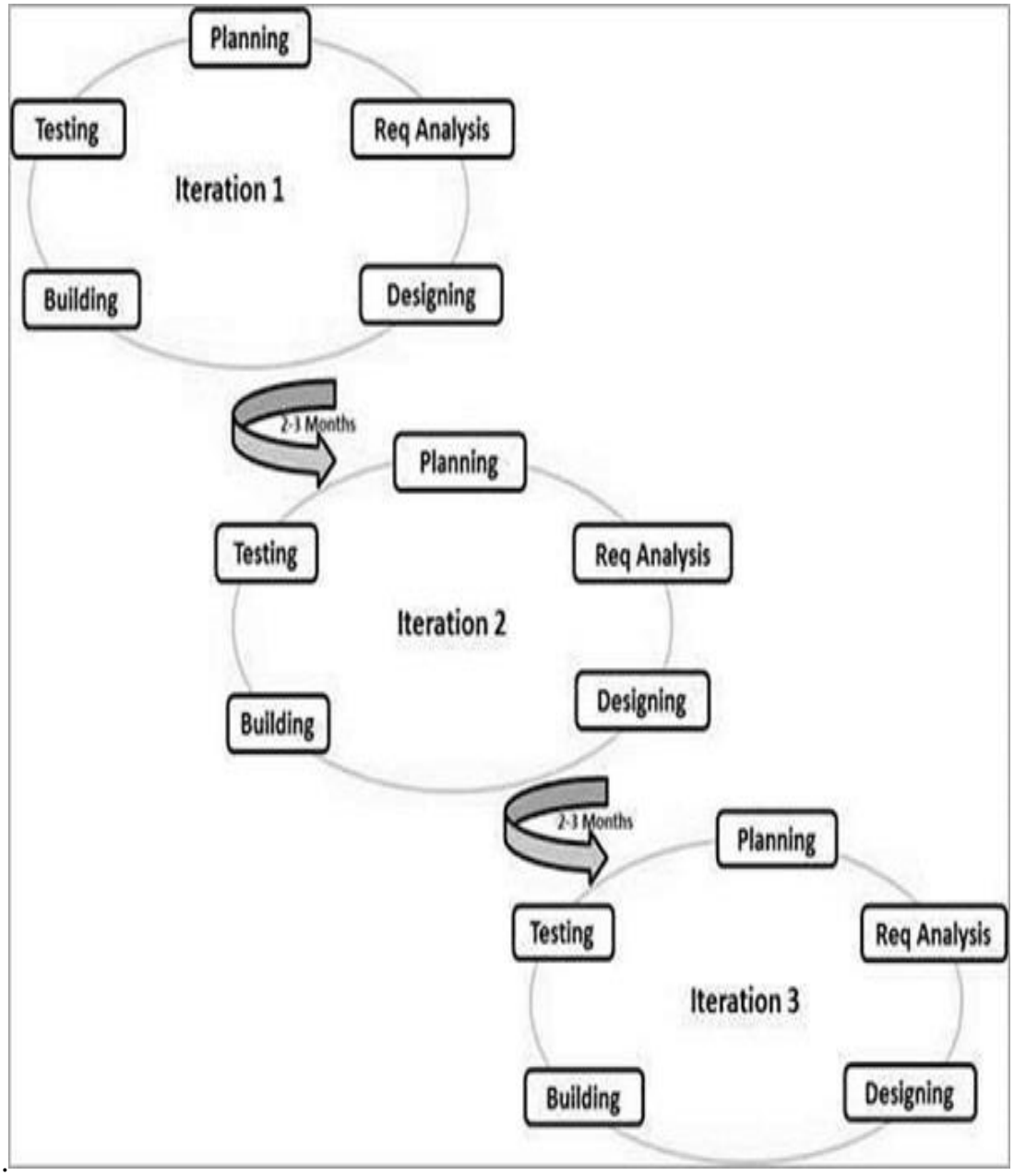
- **Requirement Gathering:** The definition of project goals and high-level requirements.

- **Requirement Analysis:** Refining and analyzing the requirements to define clear, actionable tasks.
- **Design:** The design of the solution based on the requirements.
- **Coding:** Developing the actual software components.

- **Unit Testing:** The testing of the individual components so that they perform according to expectation.

- **Acceptance Testing:** Verification of the product that meets the needs and requirements of the user.

Agile allows teams to be flexible and adaptable while iteratively delivering incremental value to the customer through this process.



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7.2 PRINCIPLES OF AGILE MODEL:

• In each Agile project, a customer representative is usually included in the team to maintain close communication with the customer and ensure a clear understanding of requirements during development. At the end of each iteration, stakeholders and the customer representative review the progress and reassess the requirements.

• The Agile model emphasizes delivering working software over producing extensive documentation.

• Software is provided in incremental releases on a periodic, short schedule, like every week.

• The framework easily embraces and implements all changes requested by the customer concerning requirements.

Benefits:

• Pair Programming results in cleaner, more compact, and well-written code with fewer errors compared to individual developers.

• The overall development time for the project can be shortened. At the end of every iteration, the customer representative may review the new software, thereby making it easier to request changes in requirements when necessary.

Disadvantages:

• Inadequate formal documentation may result in confusion as critical decisions made during different phases are misinterpreted by different members of the team.

• If proper documentation is not done, it becomes tough to maintain and update the software once the project is completed and developers are assigned to other tasks.

7.3 SOFTWARE ENVIRONMENT

Software Environment

Android is an open-source software platform and operating system for mobile devices based on the Linux kernel. It was initially developed by Android Inc., but was later purchased by Google in 2005. Android's mobile operating system is based on the Linux kernel, and its development has been a joint effort by Google and other members of the Open Handset Alliance.

Key Features:

- ✓ A framework for building applications that enables component re-use and replacement.
- ✓ Dalvik virtual machine, designed especially for mobile devices
- ✓ A browser based on the open-source WebKit engine
- ✓ Custom 2D graphics library for optimized graphics, and 3D graphics support based on OpenGL ES 1.0 (with optional hardware acceleration)
- ✓ SQLite for structured data storage
- ✓ Media support for popular audio, video, and image formats like MPEG4, H.264, MP3, AAC, AMR, JPG, PNG, and GIF
- ✓ GSM Telephony (depending on hardware)
- ✓ Bluetooth, EDGE, 3G, and Wi-Fi support (depending on hardware)
- ✓ Camera, GPS, compass, and accelerometer (hardware dependent)
- ✓ A complete development environment featuring a device emulator, debugging tools, memory and performance profiling, and an Eclipse IDE plugin

7.4 LIBRARIES

Many C/C++ libraries are available for Android, and they are utilized by many Android system components. The Android application framework makes several features available to developers. The following is a list of some of the essential libraries:

A BSD-derived version of the standard C system library (libc), the System C library is optimized for Linux-based embedded systems.

•Media Libraries: These libraries enable recording and playback of a wide range of widely used audio and video formats, as well as static picture files, and are based on Packet Video's Open CORE. Some of them are MPEG4, H.264, MP3, AAC, AMR, JPG, and PNG.

Chapter 8- Conclusion

Future improvements could be the inclusion of advanced inventory algorithms that can predict near-expiry medicines based on usage trends. The platform can also be expanded to include a wider range of healthcare products and services, such as medical equipment or supplies, to further optimize healthcare distribution and waste reduction efforts across communities.

This system creates a sustainable approach to medicine distribution, prevents wastage, and helps those in need. The platform promotes responsible resource utilization by efficiently managing near-expiry medicines and redirecting them to NGOs. The project enhances healthcare sustainability while improving access to vital medicines for underprivileged individuals.

This project will reduce medication waste through effective management, reminders, and safe disposal or donation mechanisms. Features such as expiration alerts are designed to minimize waste, while the reminder system seeks to improve medication adherence. Safe disposal and donation options focus on redirecting unused medicines to NGOs, supporting environmental sustainability and healthcare access.

The system encourages responsible utilization of resources, as it can manage near-expiry medications with efficiency and redirect them to patients who need the medication. This system still requires addressing issues, like user engagement, and logistical issues in redistribution.

With further refinement of the interface, improved user education, and streamlined donation logistics, this project has a good potential to significantly reduce medication waste and enhance healthcare sustainability.

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Latest insights on technologies for the treatment of solid medical waste: A review

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https://www.sciencedirect.com/science/article/pii/S2213343723000489
Review on distribution, fate, and management of potentially toxic elements in incinerated medical wastes

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Disposition of Unused Medical Supplies

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https://our.oakland.edu/bitstream/handle/10323/12028/Disposition%20of%20Unused%20Medical
%20Supplies.pdf?sequence=1
Don't Let Medicines Go to Waste"—A Survey-Based Cross-Sectional Study of Pharmacists'
Waste-Reducing Activities Across Gulf Cooperation Council Countries.

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Chapter 10. Appendices

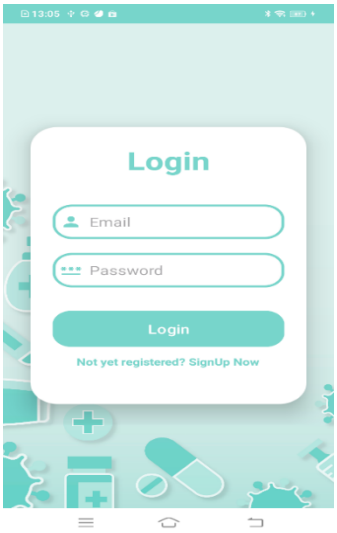
Appendix A: User Interface Designs and Screenshots

1. User Login Interface

The design of the User Login Interface would be simple, intuitive, yet efficient to permit users to be able to have easy access to the platform where they can freely interact with it and its associated features For this, these are the composing elements of a login interface:

- Username Field: Users key in their registered username to validate themselves on the system.
- Password Field: In conjunction with the username, users include their password to ensure safe logging in.
- Login Button: Once these two fields have been filled out, users press the login button to authenticate themselves and enter the portal.

This login setup allows the user to securely access their account while keeping the process as straightforward as possible.



2. Admin Dashboard

The Admin Dashboard is a central management hub that gives administrators an all-inclusive set of tools to oversee and manage various aspects of the system. It ensures the smooth and efficient operation of the platform by allowing the admin to monitor and control key functionalities related to users, donations, purchases, and partnerships with NGOs and pharmacies. Below is an elaboration of the key features available on the Admin Dashboard:

1. User Validation and Management: The administrator can validate users' registrations for access to the platform, meaning only valid users will be provided with access to the system. This function incorporates verification of users' data and authenticity, including any discrepancies or false information, thereby allowing or rejecting access based on predetermined criteria. The administrator is also allowed to manage user profiles, update information, and keep track of activities to ensure enhanced engagement and support.

2. Donation Validation: Admins are required to verify requests for donations, especially those on medicines and medical equipment. This would involve checking on the details of the donation: the type of product, quantity, and expiration dates among others, ensuring that they pass the standards set by the platform. The donated items are suitable for distribution, and the admin directs them to the right NGOs or beneficiaries. Verification of donations prevents waste and ensures essential resources reach needy people.

3. Purchase Validation: The platform allows the validation of purchases done through the website. The admins have the capability of tracking the number of orders that a user places. They can see if the item is in stock or not and verify payment transactions. If validated, they can ship out the purchase, and the stock will be adjusted. This would ensure a hassle-free purchase procedure and items purchased by the user would be received on time.

4. Adding and Managing NGOs: An essential function of the admin is adding and managing NGO partners, which are participants in receiving donations of medical supplies. The admin will authenticate the details of NGOs to help ensure they fulfill the requirements for participation - review of the mission, operational capacity, as well as legitimacy. Through management of NGO partnerships, the admin will ensure the correct direction of the impact of donations.

5. Pharmacy Management: The admin dashboard will help in managing the profiles of pharmacies. In this dashboard, an admin can add a new pharmacy to the platform. Pharmacy registrations by admins are reviewed and approved according to the legality and operational criteria. It further helps in the management of pharmacy stock, stock checking, and updating the listed products to make sure that only valid products are on the list. Maintaining a well-managed list of pharmacies helps the availability of medicines among the users.

6. System Integrity and Security: The admin is in charge of the overall integrity and security of the system. This includes monitoring user activity, detecting suspicious behaviour, and taking the necessary action to protect the platform. The admin can also manage user roles, permissions, and access levels to ensure a secure environment for all users, NGOs, and pharmacies.

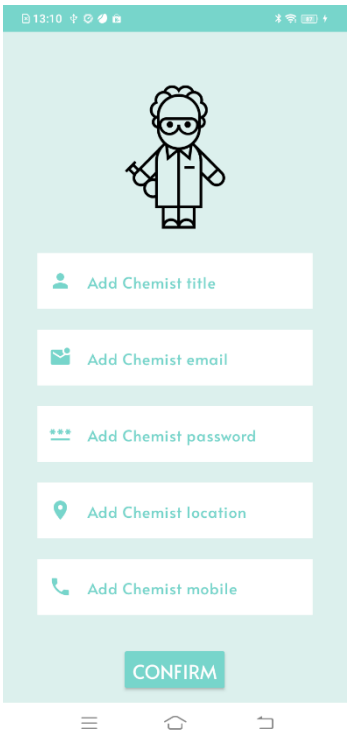
7. Reporting and Analytics: Admins can produce detailed reports about system activities, including donated items processed, registered users, and purchase status. Such reports improve data-driven decision-making for the site, increase the efficiency of the platform, identifies areas of growth and improvement, and more. Analytics also provide the behaviour tendencies of users, trends about donations as well as demand for products.

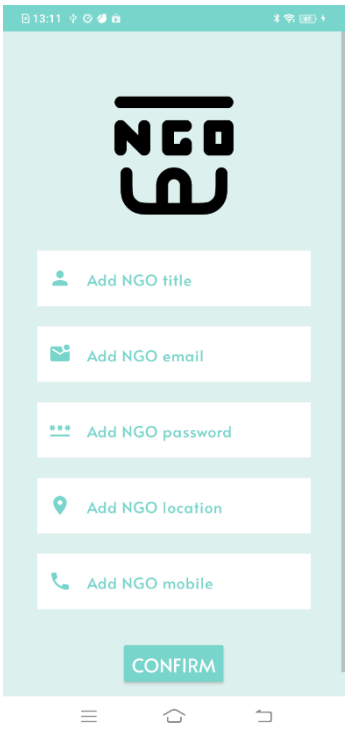
8. Communication with Users and NGOs: The admin dashboard lets the admin have direct communication with users, pharmacies, and NGOs. This would include sending a notification, the status of order updates, status of donations, or reminders regarding pending actions. The feature about communication ensures the transparency of this process and notifies all the relevant parties involved to be active.

9. User Logout and Session Management: An administrator can even maintain user sessions that log inactive users or users performing unauthorized activity; thus, no one may tamper with your platform since security is the hallmark of a solid system integrity feature.

ConclusionThe Admin Dashboard is important to the overall running and operational activities of the application. The admin, through offering different tools to validate users, manage donations and purchases, add and monitor NGO and pharmacy partnerships, and maintain system security, ensures the platform runs efficiently. This broad feature set ensures that the system aims to minimize waste, maximize the efficient use of resources, and provide assistance to underprivileged communities.

Images:


Add Chemist title
Add Chemist email
Add Chemist password
Add Chemist location
Add Chemist mobile
CONFIRM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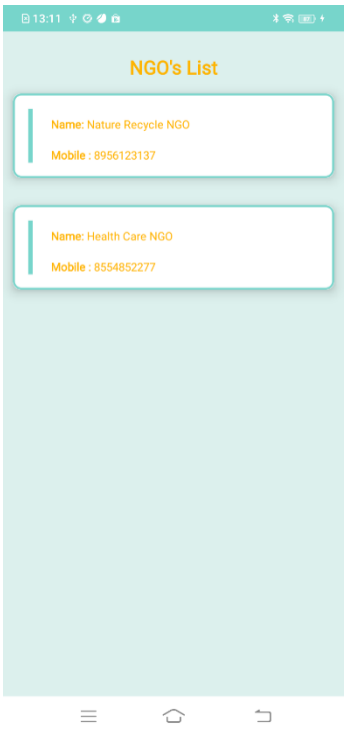
CONFIRM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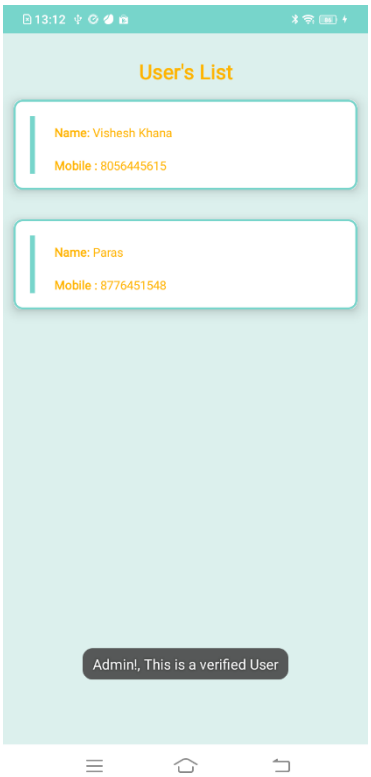
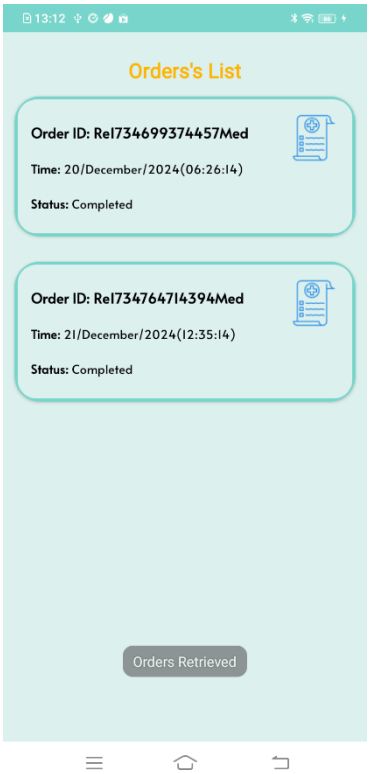
Name: Health Care NGO
Mobile : 8554852277


User's List
Name: Vishesh Khana
Mobile : 8056445615
Name: Paras
Mobile : 8776451548
Admin!, This is a verified User


Orders's List
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Time: 20/December/2024(06:26:14)
Status: Completed
Order ID: Rel734764714394Med
Time: 21/December/2024(12:35:14)
Status: Completed
Orders Retrieved


Orders's List
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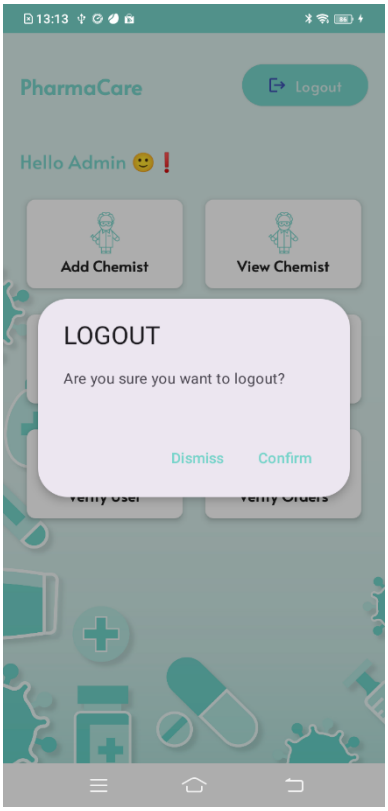
Status: Completed
Order ID: Rel734764714394Med
CLOSE



3.**NGO Dashboard**

NGO Dashboard Features:

- View and Manage Donation Requests

The NGO dashboard allows organizations to view and manage donation requests for medicines and medical supplies. The organization can sort the requests according to status and urgency, which means they can determine who needs them the most and when.

- Accept Donations:

NGOs can directly accept donation offers from users or vendors. They have the flexibility to manage accepted donations and allocate them to appropriate community needs.

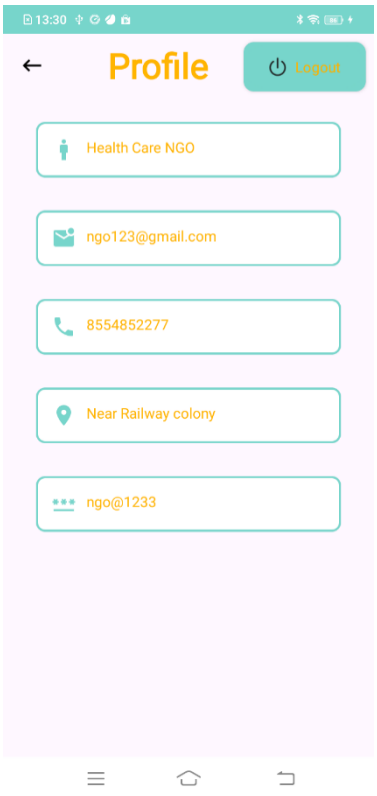
- Support for Buying Medicines:

The system allows NGOs to purchase medicines and medical supplies on behalf of the communities they serve. By collaborating with pharmacies and sellers, NGOs can help provide affordable, necessary treatments to underprivileged populations.

- Disbursals to Communities:

Upon the donation or sale, medicines are disbursed by NGOs into the communities and specifically to underprivileged communities around economically disadvantaged areas to ensure that it is reaching people in need.

Images:



3. User Dashboard

Post-Login Features:

After successful login, users are taken to their personalized dashboard where they can explore the various services the platform offers. These features include:

1. Browsing Medicines and Medical Supplies:

Users can search for and view a wide range of medicines and medical supplies. The catalog is organized into various categories such as:

- ✓ Medicine Search: Users can search for specific medications by name, type, or category.
- ✓ Product Details: Each product provides detailed information, including uses, instructions, price, and availability.

2. Receiving Notifications:

Users will receive notifications regarding:

- ✓ New Products Available: News of new drugs or medical equipment coming on the platform.
- ✓ Near Expiry Medicines: Medicines nearing expiry, so users can purchase or donate them in time.
- ✓ Donation and Purchase Offers: When medicines or supplies are available for donation or when special offers or discounts are going to be held.

3. Uploading Prescriptions:

Users can upload their medical prescriptions, which are needed to buy prescription-based medicines. The process is as follows:

- Prescription Upload: Users can upload an image of their prescription for verification.
- Prescription Verification: The uploaded prescription will be verified before proceeding with the order, ensuring the validity and appropriateness of the prescribed medicines.
- Order Placement: Once the prescription is validated, users can purchase the prescribed drugs.

4. Order Management:

- Order Placement: After the selection of drugs, an order can be placed. Users are able to order the required goods with an added choice of uploading the prescription when it is applicable.
- Order History: This will allow the user to see all his/her previous orders and track the purchased

products along with their details.

Key Features of the System:

a. User Dashboard:

The user dashboard is the central hub for all activities. It will show available medicines, order status, notifications, and allow users to interact with the system in a seamless way.

b. Medicine and Supplies Search:

Users can browse, filter, and search for a variety of medicines and medical supplies that they need. The website has advanced filters for better navigation, such as by category, brand, dosage, and price.

c. Notifications System:

The website features an integrated notification system that keeps users updated on the following:

- New medicine arrivals
- Discount offers
- Medicine expiry warnings
- Donation requests

This way, people are always updated with the newest product and services developed on the system.

d. Uploading Prescriptions:

For prescription medicines, users can upload prescription documents right from the system. Such files are checked before the purchase is made, so that no unauthorized prescriptions are processed. This feature ensures the correctness and legality of purchases being made.

e. User Profile Management:

Users can edit information such as name, contact addresses, and more from the self-service dashboard themselves.

Post Login Activity Streams

Once successfully logged in, each user has a full set of services and functionalities such as:

1. **Search/Browse:** browse medicines, retrieve detailed information available, and then conclude what to purchase.

2. Upload Prescription: For Prescription medicines, he uploads his/her prescription for subsequent verification and purchase process.

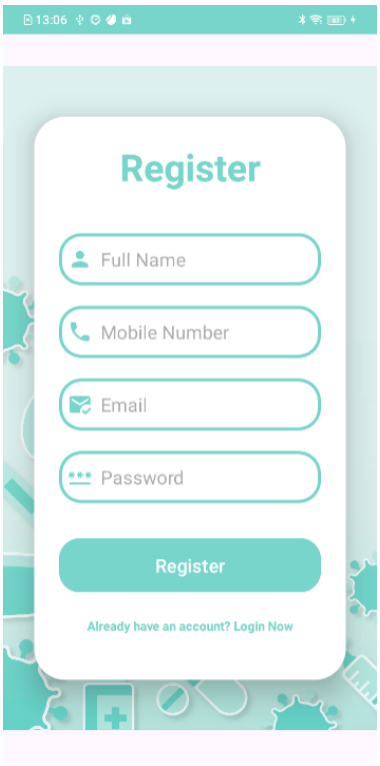
3. Buy Orders: Once prescribed, the individual can order medicine and medical materials from the online portal.

4. Updates: Expiration reminders, discounted offers, introduction of new items, and contributions can be alerted.

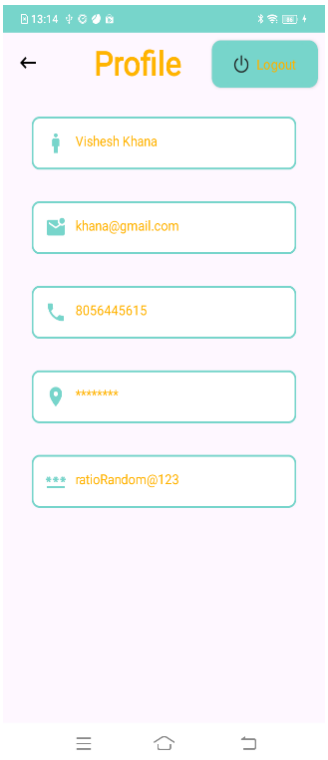
Conclusion:

The User Login Interface along with all the subfeatures on offer, provides an easy and efficient user interface from accessing to interaction with the platform. Upon logging into the user account, one gets access to medicines and prescription uploading with effortless purchasing of all kinds of medical supplies. On this level, it's equipped with its notification system, which helps the user stay abreast with the latest updates, thereby enabling an easier upkeep of essential health-related aspects. User-friendliness and ease of access characterize the entire system.

Images:


Register
Full Name
Mobile Number
Email
Password
Register
Already have an account? Login Now


Products
Paracetamol
₹250.00
Qty: 1
Status: Your request has been Accepted by Nature Recycle NGO.
Metformin
₹300.00
Qty: 1


Profile
Logout
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khana@gmail.com
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****
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Greetings
Vishesh Khana
Medicines
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₹250.00
ADD TO CART
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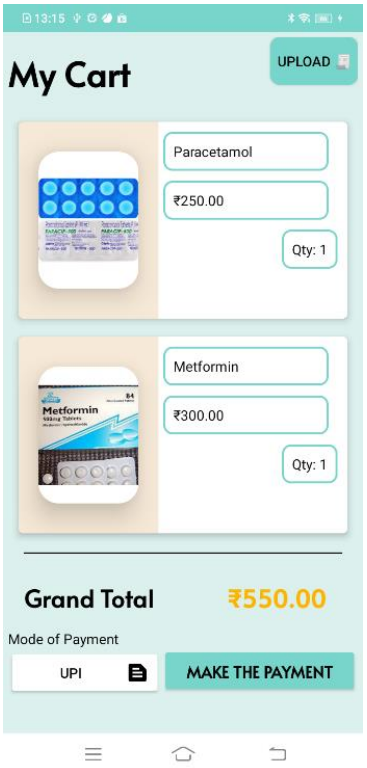
Go to Cart


My Cart
UPLOAD
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₹250.00
Qty: 1
Metformin
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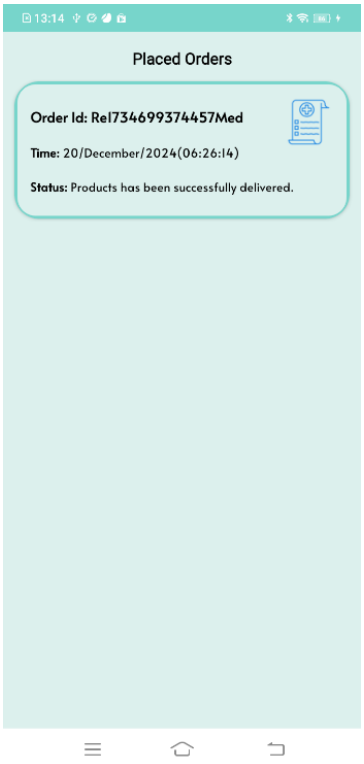
Qty: 1
Grand Total
₹550.00
Mode of Payment
UPI
MAKE THE PAYMENT


Placed Orders
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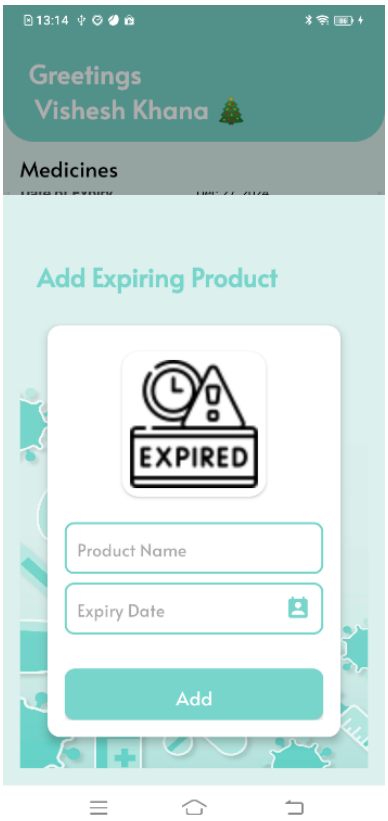
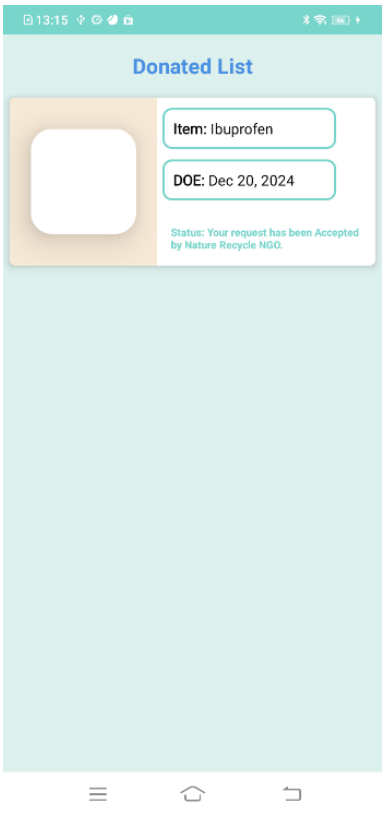
Time: 20/December/2024(06:26:14)
Status: Products has been successfully delivered.





Appendix B: Test Cases and Results

Test Case 1: User Registration

- **Objective**: Verify the successful registration process for new users.
- **Procedure**:
    1. Open the registration page within the application.
    2. Fill in the required fields with valid user details (e.g., name, email, password, etc.).
    3. Submit the registration form by clicking the "Signup" button.
- **Expected Outcome**: The user's data is saved in the database without errors.
- **Observed Outcome**: The process was completed as expected, and the system stored the data successfully.

Test Case 2: Admin Inventory Management

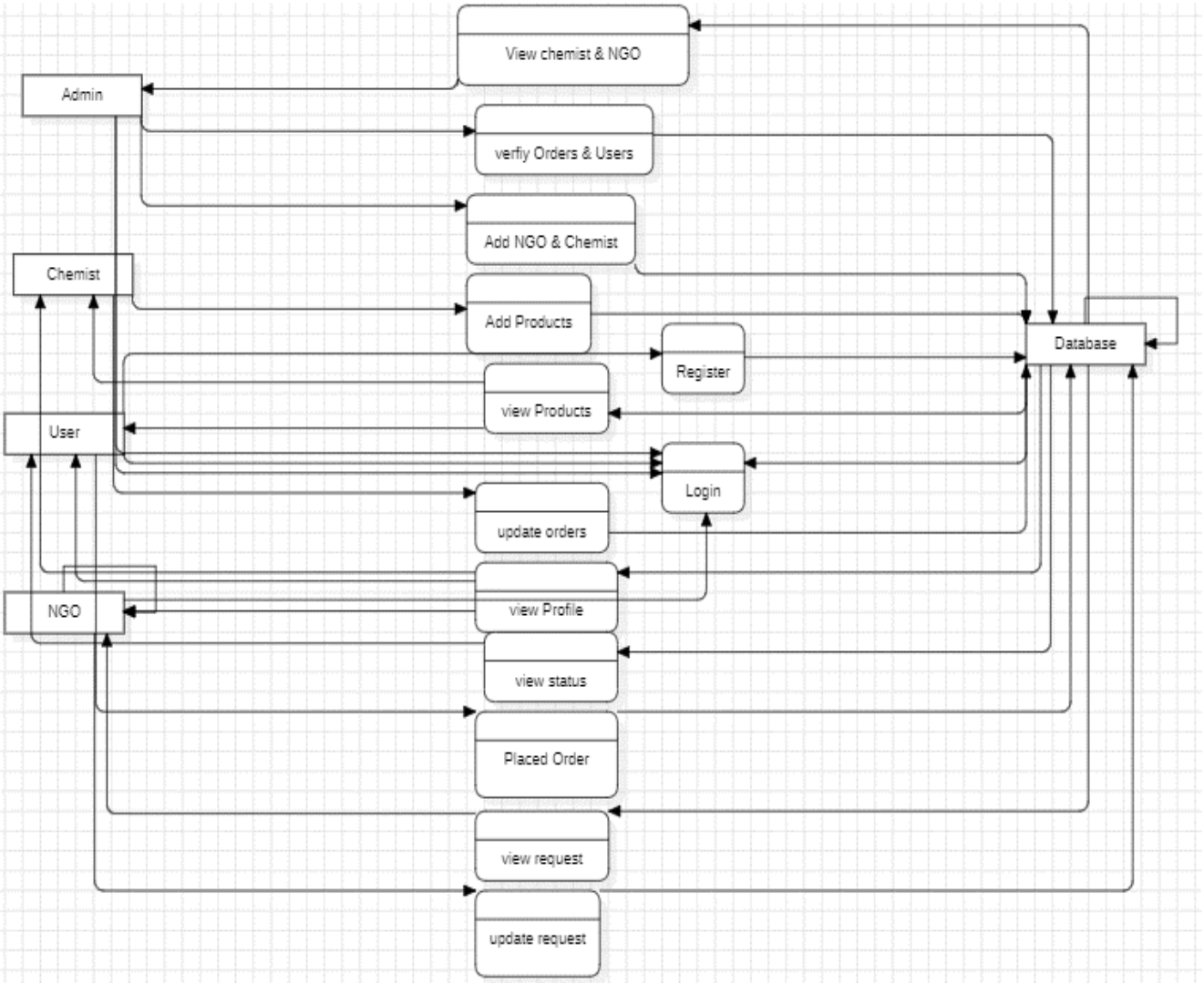
- **Objective**: Ensure that the admin can accurately flag medicines nearing their expiration date.
- **Procedure**:

1. Log into the application as an admin.
2. Access the inventory management section from the dashboard.
3. Identify medicines approaching their expiry date and select them.
4. Update their status by marking them as near-expiry.

- **Expected Outcome**: The selected medicines are flagged in the system, reflecting their near-expiry status.
- **Observed Outcome**: The functionality worked as intended, and the flagged status was updated correctly.

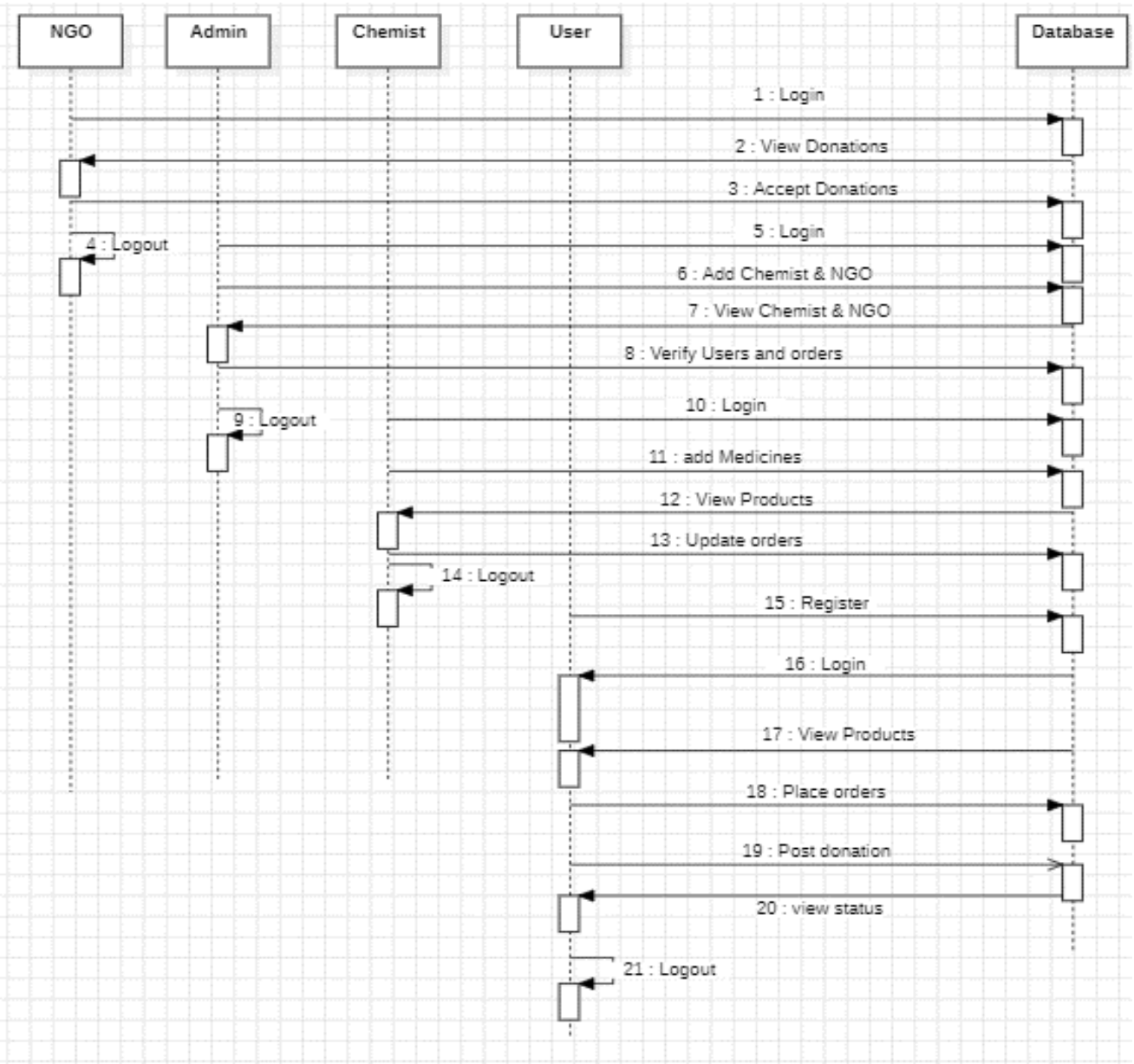
Appendix C: Supplementary Information

1. Data Flow Diagrams (DFDs):

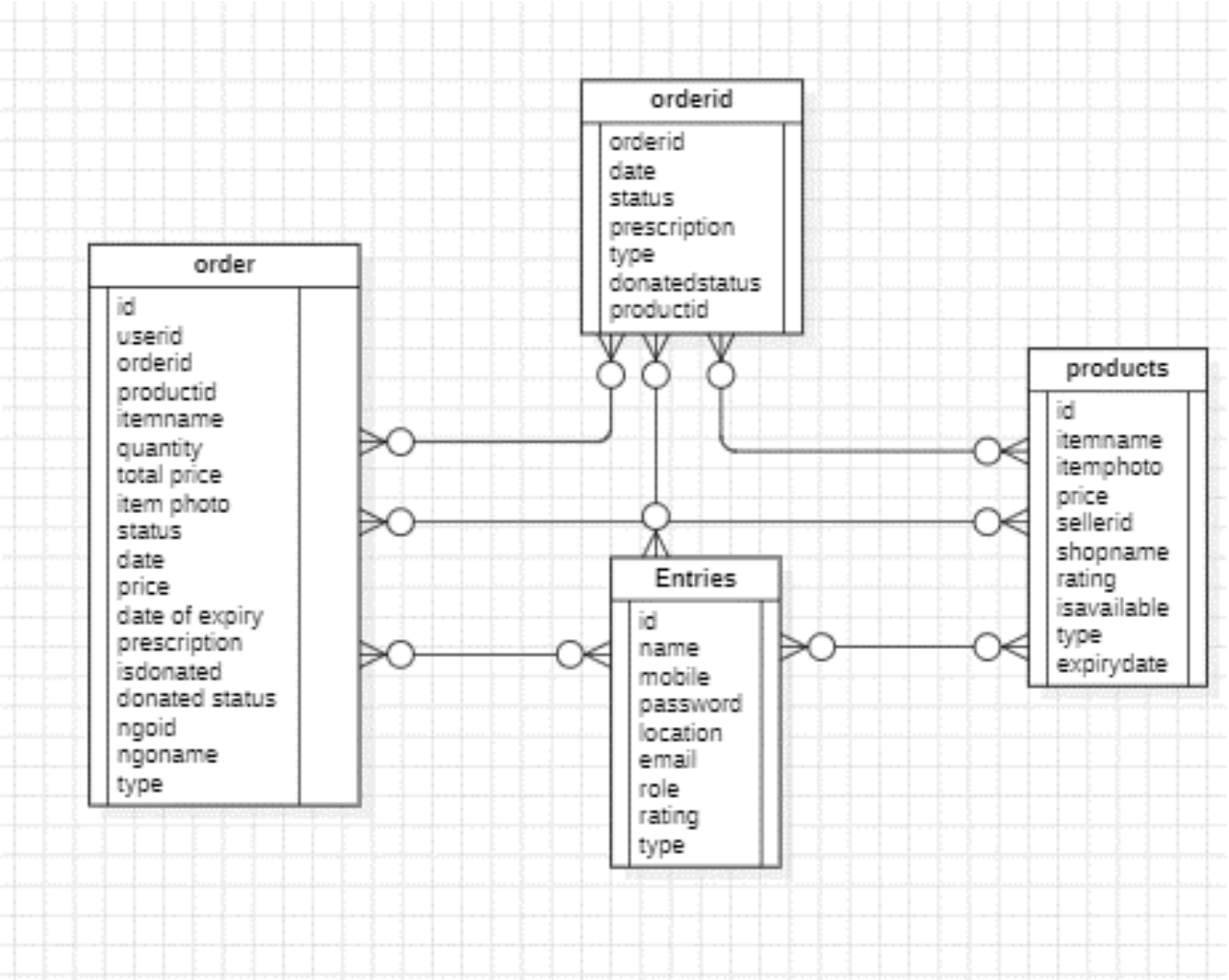


2. **UML diagrams:**

- Sequence diagram:



- ER DIAGRAM:



FUTURE ENHANCEMENT

Future enhancements could include integrating advanced inventory algorithms to predict near-expiry medicines based on usage trends. Additionally, expanding the platform to include a wider range of healthcare products and services, such as medical equipment or supplies, could further optimize healthcare distribution and waste reduction efforts across communities.

Chapter 11. ENCLOSURES

11.1 Sustainable Development Goals (SDGs):-

Goal 3: Good Health and Well-being

Goal 3: Good Health and Well-being

This goal focuses on promoting healthier lives and ensuring well-being for people of all ages. It emphasizes reducing preventable diseases, improving access to necessary medicines and vaccines, and making healthcare more inclusive. Your project contributes to this by:

- Ensuring that people in need, especially underprivileged communities, have access to essential medicines.
- Minimizing wastage of valuable medical resources and enhancing their effective use.

Goal 12: Responsible Consumption and Production

This goal encourages sustainable practices in how we consume and produce goods, aiming to reduce waste and lessen harm to the environment. It highlights the importance of efficient resource management. Your project supports this goal by:

- Reducing the wastage of medicines nearing expiration by redirecting them to those who can use them.
- Encouraging pharmacies and chemists to adopt more responsible and sustainable inventory practices.

MECHANISM TO PREVENT MEDICINE FROM GETTING WASTED

ORIGINALITY REPORT

15%	10%	6%	12%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to Symbiosis International University Student Paper	6%
2	Submitted to Presidency University Student Paper	2%
3	Sharanya S Bhat, K Shraddha, A.S Bhavana, Shreyas Suresh Rao. "Digital Medicine Assistant-Health Application for Expiry Tracking", 2021 International Conference on Disruptive Technologies for Multi-Disciplinary Research and Applications (CENTCON), 2021 Publication	1%
4	Submitted to Midlands State University Student Paper	<1%
5	www.kluniversity.in Internet Source	<1%
6	Submitted to North Ft. Myers High School Student Paper	<1%
7	Submitted to Manipal University Student Paper	<1%

8	Submitted to Arab Open University Student Paper	<1%
9	Submitted to Colorado Technical University Online Student Paper	<1%
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MECHANISM TO PREVENT MEDICINES FROM GETTING WASTED

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Abstract—

Most healthcare systems worldwide incur severe economic and environmental burdens through medication waste. Most of this wastage is avoidable, and research findings suggest that strategic interventions, particularly those involving pharmacists, can prevent a significant percentage of wastage. Pharmacists are key professionals in reducing medication wastage through interventions such as shared decision-making with the patient, medication redistribution, and reduction of the dispensing interval. Such strategies carry many benefits, but there are also some barriers to be overcome, such as arguments surrounding the feasibility and low economic value of returned medications. Another key factor is the willingness of patients participating in the re-dispensing systems, and proper awareness and education on the importance of returning unused medications play a crucial role in achieving success.

In light of these challenges, this project is to design an all-inclusive website with the objective of wastage of medicines through better management of medication. The website will be helpful to various users: patients, pharmacies, and health providers through its tools in tracking the medication inventory, reminding the patients on the expiration dates of the medicines, and the safe disposal or donation of unused medicines. There are also plans for educational tools available on the platform to inform and engage the patients in their efforts to collect used medications, redirect them through safe return systems and re-dispensing of reused medications. Such aspects will promote an integrated system from the online level down to ensuring healthier, environmentally responsible medication management processes. This shall be a long-term management of medicine waste problems along the spectrum as it shall promote mutualism among key partners in designing effective, robust solutions.

I. INTRODUCTION

With the rapid development of the Internet and the growing sophistication of cyber attacks, network security has become more important in recent years. Intrusion Detection Systems (IDS) are essential in controlling security, ensuring integrity, confidentiality, and availability of network resources, by consistently monitoring traffic and country-wide security and operational abuses [1, 2]. DoS attacks and intrusion attempts are continuously pruned from network communications. NIDS which are integrated into the pattern analysis algorithm [3].

The amount of attacks and exploits posed by internal threats, software vulnerabilities, and malware increases day by day, hence the need for reliable but lightweight security solutions is necessary [4]. However, IDS solved some issues, the data set used to train the system has an intrusiontype imbalance which hinders the problem of abuse and anomaly behavior [2]. The vulnerabilities of computers are aggravated by the interconnection of systems if proper Windows measures are not in place while protecting important data [6][5]. With better detection capabilities in IDS, companies' systems would be Darwin devolution where massive data loss would be able to dissolve [6, 7]. In this context, the clear role of IPS is to act as prevention and IDS to be

detected so that any event that crosses the IDS threshold level should be fully examined and investigated. This is no more than a consolidation of the two concepts into a single entity [3][8]. Furthermore, these systems not only ensure the functional security of data but also assist in the combat of malicious activities against the enterprise network environment by reporting the transgressors of any security policies [9]. Deployment of NIDS has become a paramount prerequisite for successful resistance and offensive operations against multifaceted threat vectors faced by organizations in the modern computing world [8]. Ahmad, Z., et al. enable an introduction and or central supporting text for new researchers in this important area by providing timely data and considering all existing ML and DL papers focused on NIDS [1].

The NIDS selection is important especially as part of an organization's security framework, adding to the assertion that an IDS contributes to multi-layered defense mechanisms against cyber threats [3]. The use of various algorithms including a random forest algorithm for classifying types of network attacks, appears to improve the accuracy rates of detection for different types of attacks on the NSL-KDD dataset [4]. An adaptive IDS is designed using deep learning techniques that can detect known and zero-day attacks on the network [6]. The system makes use of an anomaly-based ID model based on fuzzy logic and increased accuracy detection rate through more complex rule-based and decision-making methods [8].

Enhancements for NIDS based on Artificial Neural Networks allow for the utilization of new datasets such as UNSW-NB15 [8]. The development of new directions in the field can help strengthen the ongoing research in the specific area of network security with the support of AI technologies [9]. Network attack communities provide a serious problem for modern society, as different types of networks, despite their size, are liable to those various threats. To reduce and of disturbance [10]. The developmental expansion of ID systems through the design of an innovative ID framework with deep learning (DL) techniques, such as Convolutional Neural Networks (CNN), and old machine learning (ML) algorithms, like Recurrent Neural Networks (RNN). The Hybrid Convolutional Recurrent Neural Network-Based Intrusion Detection System (HCRNNIDS) outcomes combine complex and simple models to get the best analytical capabilities with the highest detection problems. HCRNNIDS is purposed to distinguish network traffic behavior between normal and malicious actions, the attacks are correctly classified under their respective classes [10].

II. SYSTEM ARCHITECTURE

1. Admin Role:

1. **Purpose**: Admins are responsible for managing and overseeing the system's overall operation.
2. **Activities**:
    a. Add new users (Chemists, NGOs).
    b. Monitor and verify user activities (such as viewing placed orders and account status).
    c. Ensure data integrity by managing the database.

2.Chemist Role:

1. **Purpose**: Chemists contribute to the system by uploading available medicines and keeping track of inventory.
2. **Activities**:
    a. Add medicines to inventory.
    b. Update medicine details like expiration dates.
    c. Process user orders and donate surplus medicines to NGOs.
    d. Manage their profile and logout when done.

3.User Role:

1. Purpose: Users (patients) can register to find and request medicines or donate unused medicines.

2. Activities:

a. Register and log in to the system.
b. Browse available medicines.
c. Upload valid prescriptions to request medicines.
d. Donate unused medicines.
e. Track order status.

4.NGO Role:

1. **Purpose**: NGOs play a vital role in redistributing donated medicines to underprivileged communities.
2. **Activities**:

a. View donated medicines.
b. Accept donations based on their needs.
c. Log out upon completing their tasks.

Authentication Flow

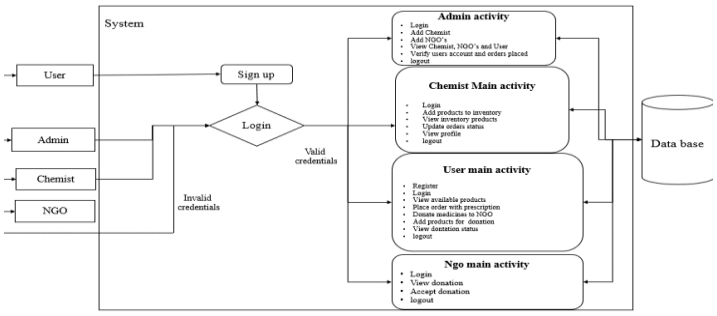
- **Sign-Up and Login**: Users register on the platform, and existing users log in using valid credentials. Invalid credentials block access, maintaining system security.

Database Integration

All activities—like adding inventory, viewing orders, and donations—are connected to a centralized database. This database ensures:

- Reliable storage of user information, medicine details, and activity logs.
- Seamless data retrieval and updates for all user roles.

This system design ensures streamlined operations, promoting transparency and accountability in medicine redistribution. By involving different stakeholders like chemists, NGOs, and users, the platform builds a collaborative approach to minimize medicine waste and support those in need



111. REQUIREMENT ANALYSIS

Functional and non-functional requirements are the backbone of any project. While functional requirements ensure that the system completes its intended purpose and meets the users' primary demands, non-functional requirements ensure that it works efficiently, securely, and reliably under various conditions. Well-balanced analysis of the two categories of requirements in the planning phase is essential in building a system that is high-performing, secure, and scalable.

Hardware Requirements

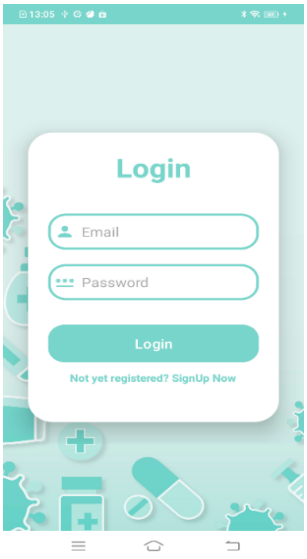
H/W System Configuration: -

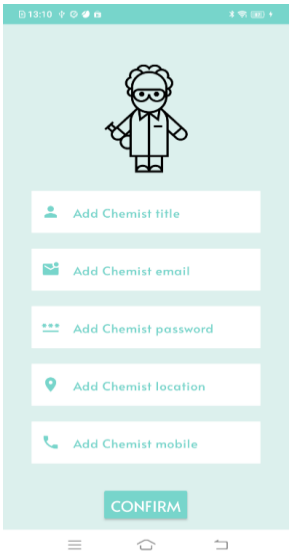
Processor	-	I3/Intel Processor
RAM	-	8 GB
•Hard Disk	-	1TB

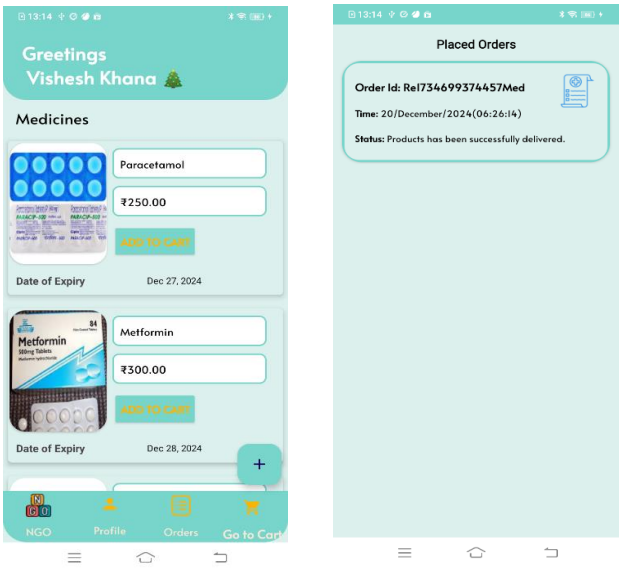
Software Requirements

•Operating System	-	Windows 10\t
•JDK	-	java
•Plugin	-	Kotlin
•SDK	-	Android
•IDE	-	Android studio
•Database	-	server script, mySQL

IV. RESULTS







V. LITERATURE REVIEW

Everyone's life is affected by drugs; some assist us in dealing with illnesses, conditions, or aches, while others are essential for maintaining our lives. Some are very costly, and others are scarce and have to be purchased in advance in remote locations. The most common problem is that we all tend to forget when our medications expire, or sometimes the strips tear off, rendering the information about the tablet or drug inaccessible.

We all spend our time writing down the same in notepads and waste time in labelling the medicines. Many try to organize their prescriptions for maintaining proper dosage information of the medicines but there is always a possibility of losing them. Notepads, keynotes and alarm reminders might come easy to us at the first thought but are not an efficient solution. There is no way of getting reminded about the expiry of any of the medi-cines that's written in a notepad. Most of the traditional applications provides the option to remind about the medicines that need to be taken on a regular basis or provide a single reminder for the expiry of medicines that are available in its entry that users can remove them from the mobile notification panel due to being busy. Apart from that, most applications available provide the feature of tracking expiry much more generally than just limited to medicines. It is the first application designed to remind its user through reminder notifications about the expired and about to expire medicines.

However, one pharmacy may not have all of the medications that the consumer requires. By collaboration, PharmaGo assists its clients in acquiring the medications required at one pharmacy instead of visiting one after the other. In a similar fashion, pharmacy operators may use image processing tools to read the prescription and undoubtedly identify which medications are required. In addition, the technology studies past sales data and gives a projection of medicine demand in the near future to the pharmacy operators. Furthermore, PharmaGo has an extremely well-qualified AI medical chatbot to help clients understand the entire process. PharmaGo offers a reliable platform to fulfill the specific requirements of pharmacy services for both pharmacists and consumers of pharmacies.

Our approach, based on WHO guidelines for medical equipment donations [1], is focused on three main areas: enhancing the technical quality of the donated devices, motivating stakeholders to take ownership of project quality improvement, and, lastly, advancing biomedical careers. We have designed realistic papers, procedures, and services that cater to a broad range of potential issues and are accessible to all parties involved- hospitals, financing partners, equipment requesters, and donors.

V. CONCLUSION

Future improvements could be the inclusion of advanced inventory algorithms that can predict near-expiry medicines based on usage trends. The platform can also be expanded to include a wider range of healthcare products and services, such as medical equipment or supplies, to further optimize healthcare distribution and waste reduction efforts across communities.

This system creates a sustainable approach to medicine distribution, prevents wastage, and helps those in need. The platform promotes responsible resource utilization by efficiently managing near-expiry medicines and redirecting them to NGOs. The project enhances healthcare sustainability while improving access to vital medicines for underprivileged individuals. This project will reduce medication waste through effective management, reminders, and safe disposal or donation mechanisms. Features such as expiration alerts are designed to minimize waste, while the reminder system seeks to improve medication adherence. Safe

disposal and donation options focus on redirecting unused medicines to NGOs, supporting environmental sustainability and healthcare access.

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