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Software Graduation Project:

ONS

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Dedication

We are sincerely grateful to everyone who helped make this work possible, no matter how small the contribution. To our loved ones, friends, and those whose quest for knowledge inspired us on our path.

Acknowledgment

We sincerely appreciate the contributions made by everyone who helped make this project a reality. We would especially like to express our gratitude to our prestigious An-Najah National University, whose unwavering support has made it possible for us to improve our nation and community.

We save the deepest gratitude for our devoted supervisor, Dr. Raed Al-Qadi. Dr. Raed gave our project his time, effort, and steadfast support. His confidence in our abilities, unwavering support through difficulties, and sincere enthusiasm for our advancement had a big influence. Our progress was aided by Dr. Raed's thoughtful and motivating advice, even in moments when our plans faltered. His genuine interest in our progress made every accomplishment more meaningful. His enthusiasm for our project was contagious. We are incredibly grateful to our supervisor, mentor, and inspiration, Dr. Raed Al-Qadi, for all of his help and support along the way.

We also thank everyone else who supported and encouraged us, sticking by us through good times and bad. We offer this report and project with sincere gratitude, as a testament to the teamwork and assistance received.

Disclaimer

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Abstract

The rapid growth of the elderly population is creating major challenges for families and healthcare providers. As people age, they often face complex health issues, limited mobility, and social isolation. While there are many apps available today, most only focus on one specific problem—like emergency alerts or health tracking—and fail to connect all the people involved in a senior’s care.

This project introduces ONS, an all-in-one web platform designed to bridge this gap. ONS connects elderly users, their families, professional caregivers, and retirement home managers within a single, easy-to-use system. The platform offers essential tools for health monitoring, medication management, and emergency response. It also includes GPS tracking with “safe-zone” alerts to ensure users stay safe. While families can use the app to stay updated on their loved ones, caregivers and retirement homes can use it to manage daily tasks, work shifts, and professional reports more efficiently.

Beyond physical health, ONS focuses on emotional support. It features an AI-based companion for conversation and reminders, as well as a private online community where seniors can socialize to reduce loneliness. To ensure safety and trust, the platform includes strong privacy settings, allowing seniors to control who can access their data. By combining these features into one secure system, ONS aims to improve the quality of life for the elderly and make coordination much easier for everyone involved.

Chapter 1

Introduction

As more people live longer, caring for the elderly has become a major challenge. Seniors often deal with a mix of health issues, physical limitations, and feelings of loneliness. Because of this, we need smart digital tools that support not only the elderly but also their families, professional caregivers, and retirement homes. Currently, traditional ways of providing care are struggling to keep up with the demand for constant monitoring and emotional support, especially when resources are limited.

The idea for ONS didn't just come from books or theories; it came from watching real people deal with these issues every day. By talking to seniors and their families, we saw firsthand how hard it is to manage chronic illnesses, coordinate care between different people, and handle emergencies. One of the biggest problems we noticed was social isolation. It became clear that there wasn't a single, secure platform that connected everyone involved in the care process effectively.

Families often find it stressful to balance their own lives while making sure their loved ones are safe. At the same time, professional caregivers and retirement homes often struggle to keep track of health data, medications, and work shifts. When communication is poor, it leads to delays and more stress for everyone. This is why we created ONS—to fill these gaps and make sure information flows smoothly between the elderly, their families, and their doctors or caregivers.

ONS is more than just a typical website; it is a complete care system. It combines health monitoring, emergency alerts, and location tracking in one place. We also believe that mental health is just as important as physical health. That's why we included an AI companion for conversation and a private community where seniors can talk to each other. Throughout all of this, we make sure the elderly person stays in control of their own information through easy-to-use privacy settings.

This report explains how ONS was designed and built. It covers the main features, how the system works, and the different roles for each user. By using modern technology and smart services, this project shows how digital solutions can make elderly care more organized, more effective, and—most importantly—more human.

Chapter 2

Constraints and Earlier Coursework

2.1 Constraints

Building the ONS platform wasn't always easy. We faced several challenges that required careful thought and practical solutions to keep the project on track. Here are the most significant obstacles we encountered:

Difficulty in Gathering Real-World Elderly Care Requirements

One of the biggest hurdles was getting accurate information about what elderly care truly needs. This field is very sensitive because it involves private health data and complex emotional needs, making it hard to find detailed "real-life" data.

To solve this, we took a multi-step approach:

- We talked to families who care for elderly relatives to understand their daily struggles, like managing medicine and handling emergencies.
- We consulted with caregivers to learn about the "behind-the-scenes" work, such as managing shifts and logging health incidents.
- We researched current apps to see where they were falling short and where ONS could do better.

Managing a Complex System with Multiple Parts

ONS is a large project with many different sections for elders, families, caregivers, retirement homes, and admins. Making sure all these parts worked together smoothly was a challenge, especially since each user type needs different permissions and features.

To stay organized, we built the backend using a "modular" approach—meaning we kept different functions (like data storage and user routes) separate. We also used GitHub for version control, which allowed us to track every change, review our code, and merge new features without breaking the system.

2.2 Earlier Coursework

The ONS platform is the result of everything we learned throughout our degree. Several specific courses were essential to making this project a success:

- **Object-Oriented Programming (OOP):** Even though we used JavaScript for the backend, the core principles of OOP—like organizing code into reusable pieces and keeping different parts of the program independent—helped us build a system that is easy to maintain and grow.
- **Database Design:** This was one of the most important courses for ONS. Since the platform handles a lot of data (like health logs, medication schedules, and user profiles), we needed a solid structure. We used what we learned about MySQL to create organized tables and ensure that all information is stored safely and correctly.
- **Software Engineering:** This course gave us the "roadmap" for the entire project. It taught us how to analyze requirements, plan the system architecture, and use professional tools like GitHub. It helped us move from just "writing code" to "building a professional product."
- **Critical Thinking and Research Skills:** This course was vital for the documentation and research side of the project. It helped us look at existing solutions critically, find the gaps, and present our technical work in a clear, academic way for this report.

Chapter 3

Literature Review

Building digital tools for seniors requires a deep understanding of the challenges that come with aging, as well as the technology available to help. By looking at existing research, we can see where current systems succeed and where **ONS** can offer something new.

3.1 The Challenges of Aging

Getting older often brings chronic health problems, difficulty moving, and a higher risk of emergencies. Research shows that to live a good life, seniors need constant health monitoring, quick medical help, and emotional support. Families and professional caregivers often find it hard to coordinate these different types of care, especially when the elderly person lives alone or in a care facility.

While many technologies exist to help, most of them focus on just one thing—like a wearable watch for heart rates or an emergency button. There is a lack of "all-in-one" platforms that connect the senior, their family, and their doctors in a single, organized way.

3.2 Health Monitoring and Assistive Tech

Technology has come a long way in tracking vital signs, medicine schedules, and daily activity. Research shows that using wearable devices and mobile apps can help catch health problems early, reduce hospital visits, and speed up emergency response times.

However, two big problems remain: privacy and usability. Many apps are too complicated for seniors to use, and caregivers often get overwhelmed by too much "raw data" rather than clear, helpful updates. This highlights the need for a system that is easy to use and provides the right information to the right person.

3.3 Remote Care and Communication

In recent years, "remote care" has become much more popular. These platforms allow families to check on their loved ones and manage their care without needing to be physically present. This is especially helpful for people who live far away or have busy schedules.

Studies show that digital platforms for reporting emergencies and sharing data make care much more efficient. However, many current tools are strictly "medical" and forget about the human side of care. They often miss features for emotional support or community interaction, which are essential for a senior's happiness.

3.4 Emotional Well-Being and Social Life

Loneliness is a serious risk factor for the mental and physical health of seniors. Staying social and mentally active can actually help slow down memory loss and improve overall health.

New research suggests that AI companions and online communities can help seniors feel less isolated. While these technologies show great promise, they are rarely combined with actual health and medical tracking. This gap is exactly what ONS aims to fill by looking at the "whole person"—addressing both their physical health and their emotional needs.

Chapter 4

Methodology

4.1 Tools, Methods and Programming Languages

4.1.1 Tools

The development of the ONS (Older Needs Support) system required the use of various modern tools and platforms to support mobile application development, backend services, database management, communication, payments, and artificial intelligence features. The following tools were utilized throughout the project:



Figure 4.1: Android Studio

Integrated Development Environment (IDE) used for Android application development, providing a feature-rich environment for UI design, testing, and debugging.



Figure 4.2: Visual Studio Code

A lightweight and powerful source code editor used for backend development, API implementation, and project management.



Figure 4.3: GitHub

A web-based version control platform used for source code management, collaboration between team members, and tracking project progress.



Figure 4.4: Postman

An API development and testing tool used to create, test, and validate RESTful APIs implemented in the backend.



Figure 4.5: XAMPP with MySQL

XAMPP is an open-source cross-platform web server solution stack, and MySQL is used as the relational database management system (RDBMS) for storing application data.



Figure 4.6: OpenAI API

An artificial intelligence platform used to implement the AI Companion chatbot, providing conversational assistance, reminders, and intelligent responses for elderly users.



Figure 4.7: PayPal

An online payment platform integrated into the system to handle secure financial transactions between families, caregivers, and retirement homes.



Figure 4.8: Twilio

A cloud communication platform used to send SMS and phone notifications for emergencies, alerts, and important system updates.



Figure 4.9: OpenStreetMap API

A mapping and navigation service used for location tracking, distance calculation, and route visualization within the GPS monitoring module.



Figure 4.10: Apple Health API

Used to receive health-related data from Apple devices, enabling integration of wearable health metrics into the backend monitoring system.



Figure 4.11: Twilio SendGrid

Twilio SendGrid is used for sending email notifications to families, caregivers, and administrators.

Figure 4.12: Android GPS and Location Services

Android built-in location services are used to track the real-time position of elderly users and transmit GPS coordinates securely to the backend system.

4.1.2 Programming Languages

The ONS system was developed using a combination of modern programming languages, each selected according to its suitability for a specific component of the system, including backend services, mobile application development, data processing, and health device integration.

Back End



Figure 4.13: Node.js

Node.js was used as the primary backend programming language. It is a JavaScript runtime environment that enables efficient server-side development and supports scalable RESTful APIs. Node.js was used to implement authentication, role-based access control, health monitoring logic, notifications, and communication between all system modules.

Front End (Mobile Application)



Figure 4.14: Flutter

Flutter, using the Dart programming language, was employed to develop the mobile application. Flutter enables the creation of responsive and accessible user interfaces for elders, families, caregivers, and administrators, while supporting cross-platform deployment.

Data Processing and Analysis



Figure 4.15: Python

Python was used for dataset handling, preprocessing, and experimentation during the research and analysis phase. Its rich ecosystem of libraries makes it suitable for data analysis, validation, and preparation of health-related datasets.

Health Device Integration



Figure 4.16: Swift

Swift was used for integrating Apple Health data on iOS devices. It enables secure access to health metrics such as heart rate and activity data, which can be forwarded to the backend for monitoring and alert generation.

4.1.3 Database

The ONS platform relies on a structured, scalable, and modular data storage architecture to support its multi-role healthcare ecosystem. Due to the highly relational nature of the system, a relational database was selected as the primary storage solution.

Relational Database (MySQL)

MySQL was chosen as the main database management system for the ONS platform. It is a widely used open-source relational database known for its reliability, performance, and strong support for complex relationships. The platform involves multiple interconnected entities such as elders, families, caregivers, retirement homes, administrators, health records, emergencies, and financial transactions, making a relational model the most suitable choice.

The database schema is organized into logical groups based on system functionality rather than isolated tables, which improves maintainability, clarity, and future scalability.

Due to the large number of tables in the database, only the most representative tables are presented visually in this section. The remaining tables follow the same relational design principles and are grouped logically according to system modules.

Core User and Role Tables These tables form the foundation of the ONS system and manage authentication, authorization, and role-specific information.

- Admins table: manages system administrators and elevated permissions.
- Elders table: stores personal, medical, and accessibility-related information.
- Family members table: represents elder guardians and primary decision makers.
- Caregivers table: includes both freelance and retirement-home caregivers.
- Retirement homes table: stores institutional care provider data.

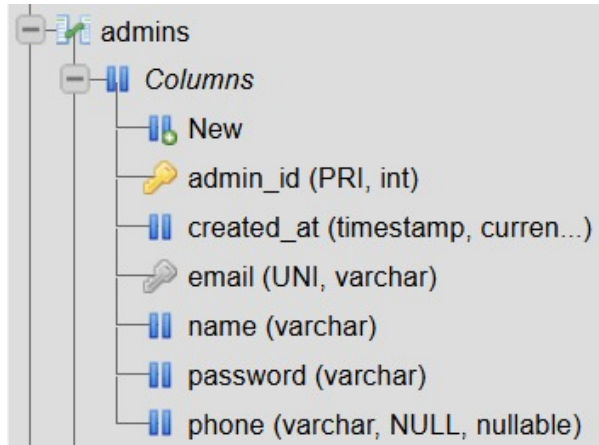


Figure 4.17: Admins Table Structure

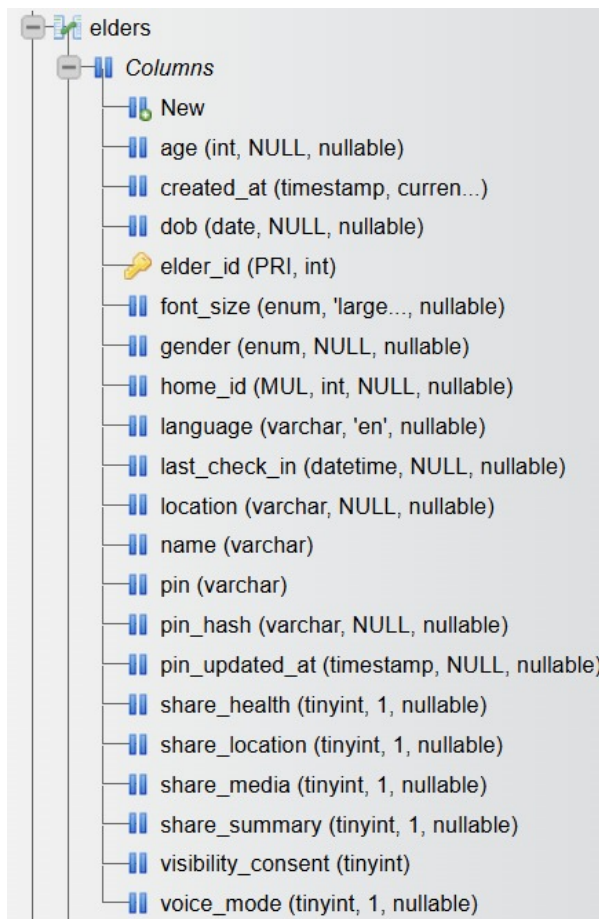


Figure 4.18: Elders Table Structure

Health and Monitoring Tables Health monitoring is a core component of the ONS platform. These tables store both manually recorded health data and device-based measurements.

- Health logs table: stores vital signs such as blood pressure, blood sugar, temperature, and heart rate.
- Health Kit data table: stores health data collected from wearable devices such as Apple Health.
- Medications and medication logs tables: manage medication plans and adherence tracking.
- Emergency records and alert history tables.

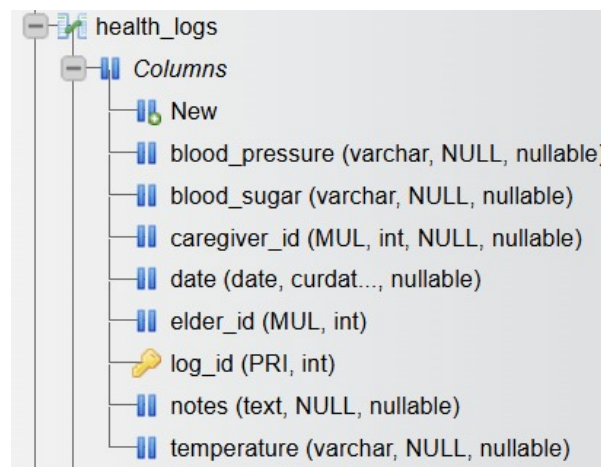


Figure 4.19: Health Logs Table Structure

Care Management and Operations These tables support the daily operation of care services and ensure accountability and proper monitoring.

- Elder-caregiver assignment tables.
- Caregiver shift tracking tables.
- Attendance, check-ins, and daily summaries tables.
- Incidents and staff notes tables.

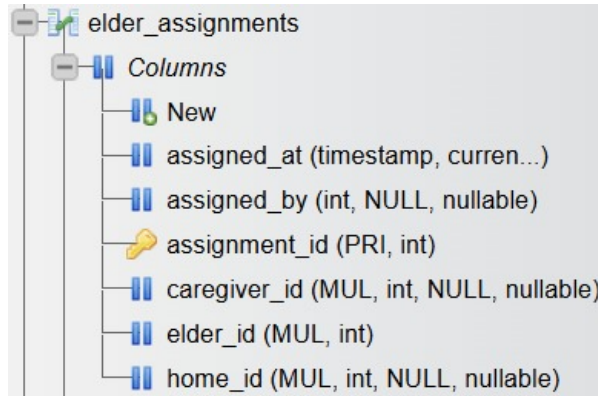


Figure 4.20: Elder-Caregiver Assignments Table

Location Tracking and Safety The ONS platform provides real-time location tracking and safety monitoring for elders. Safe zones can be defined for each elder, and alerts are generated automatically when an elder leaves a designated area.

- Elder location history table.
- Safe zones table.
- Check-in and attendance tables.

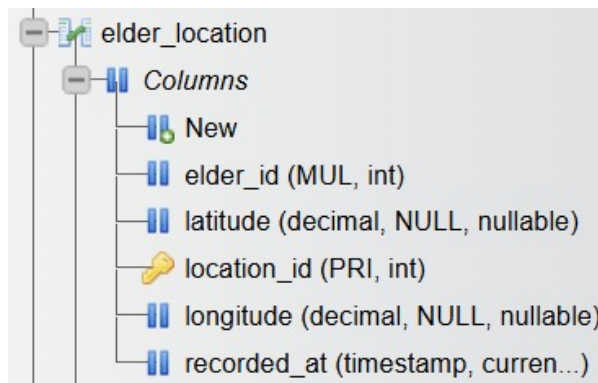


Figure 4.21: Elder Location History Table

Communication and Community To encourage social engagement and communication, the database includes tables that manage community interaction and notifications.

- Community posts and comments tables.
- Notifications and alert tables.

- Call requests and call logs tables.
- Visits scheduling and shared calendar tables.

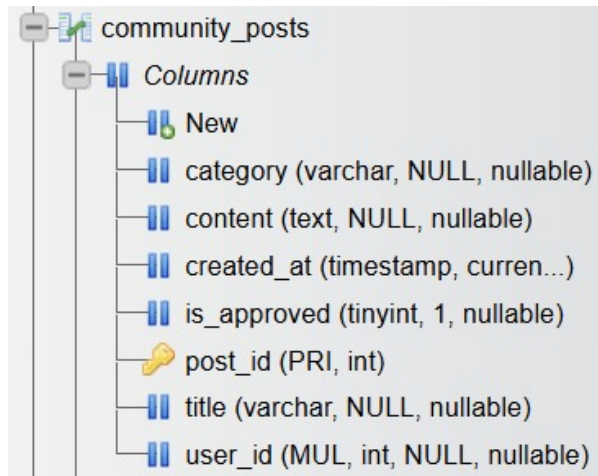


Figure 4.22: Community Posts Table

Payments and Transactions Financial operations within the ONS platform are handled through secure and well-structured financial tables.

- Payments table for completed transactions.
- Transactions table for income and expense tracking.
- Reviews table for caregiver and service evaluation.

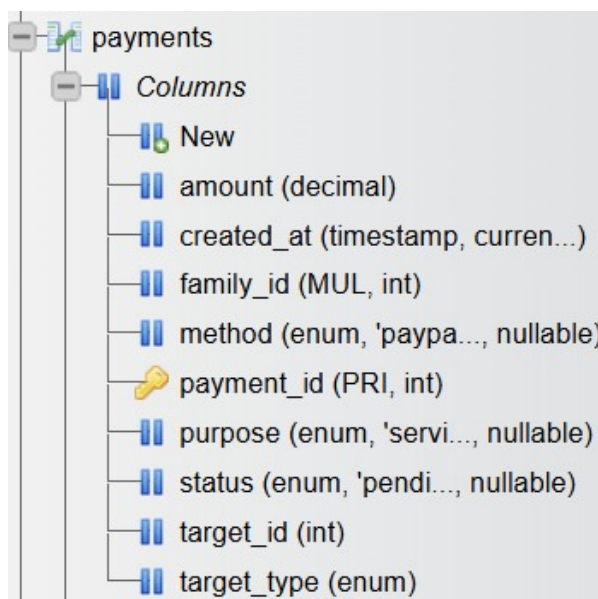


Figure 4.23: Payments Table Structure

Chatbot Data Storage (MongoDB)

In addition to MySQL, MongoDB was used for storing conversational data related to the AI companion. Due to the unstructured and dynamic nature of chatbot conversations, a NoSQL database was more suitable.

MongoDB is used to store:

- Chat history and conversation context.
- AI-generated responses.
- Reminder and safety keyword interactions.

This hybrid database architecture combines the strengths of relational databases for structured healthcare data and NoSQL databases for flexible conversational data, resulting in an efficient and scalable storage solution.

4.1.4 Security and Privacy Considerations

Security and privacy are at the heart of the ONS platform, especially since we handle sensitive personal and health information. To keep the system safe, we use JSON Web Tokens (JWT) for authentication. This ensures that only authorized users can log in and access the system's resources.

We also use Role-Based Access Control (RBAC) to manage what each user can see. This means that an elder, a family member, a caregiver, and an administrator each have different levels of access. For example, a caregiver might see health logs, while an administrator focuses on system management.

All sensitive data, including medical records and emergency information, is stored securely in our database. We believe that elders should always have a say in their own privacy, so we included consent mechanisms. These allow seniors to decide exactly which family members or caregivers are allowed to view their personal data. By following these steps, ONS ensures that the platform is not only secure and reliable but also meets high ethical standards for healthcare.

4.2 System Features Implementation

In this section, we explain how the core features of the ONS platform were built. The system was designed to be user-friendly for several different groups, including seniors, their families, and professional caregivers. We focused on making the interfaces clear and ensuring that each user can only access the data and tools relevant to their specific role.

4.2.1 Administrator Module

The administrator module is the "command center" of the ONS platform. It gives administrators the oversight they need to monitor activity, manage users, and make sure the system is running smoothly. From this module, admins can approve new partners, track financial transactions, and respond to urgent health alerts.

Administrator Authentication

To keep the system secure, we built a dedicated login interface for administrators. Admins must select their specific role and enter their registered email and password to gain access. Once their identity is verified, they are automatically directed to the main dashboard.

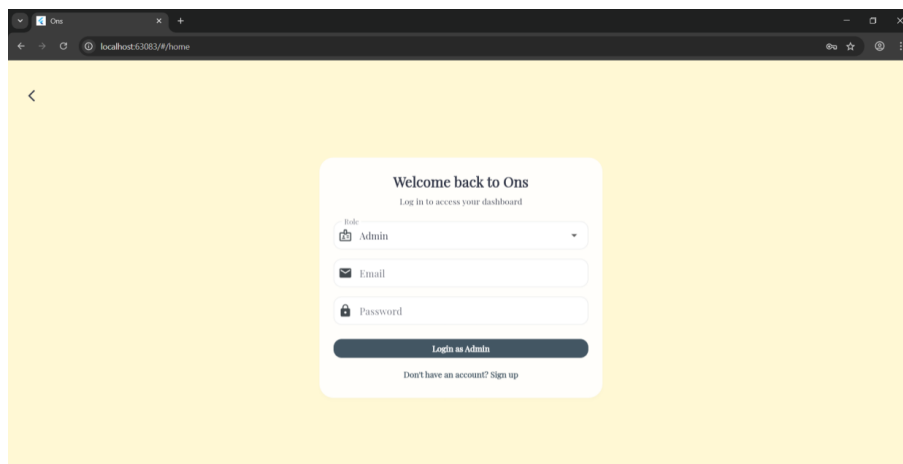


Figure 4.24: Administrator Login Interface

Administrative Dashboard

The dashboard is designed to give administrators a quick overview of everything happening on the platform. At a glance, they can see important statistics, such as how many caregivers or retirement homes are waiting for approval and if there are any active health alerts that need attention. It serves as a central hub for navigating to other parts of the system.

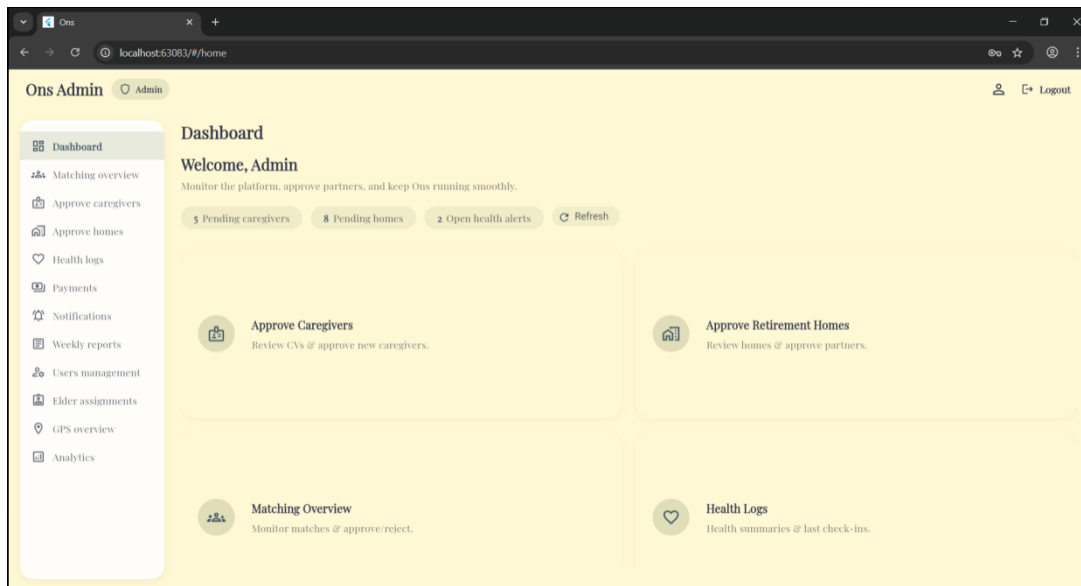


Figure 4.25: Administrator Dashboard Overview

Caregiver Approval Management

Since safety is a top priority in elderly care, we included a vetting process for all caregivers. When a caregiver applies to join ONS, administrators can review their personal details, contact information, and CV. To help with the decision, the system displays an AI-generated score based on the caregiver’s background. Admins can then choose to either approve or reject the application.

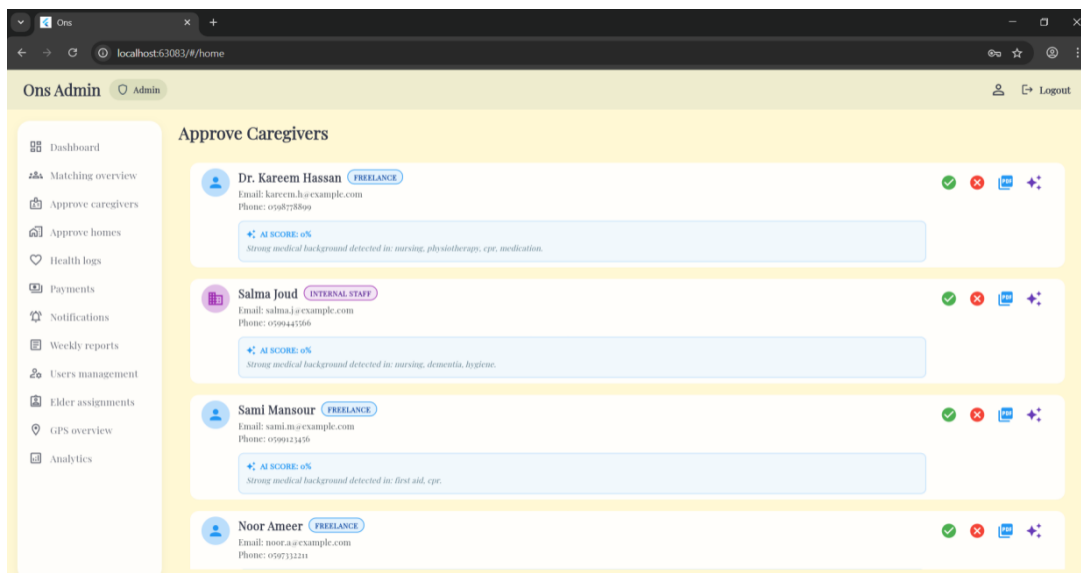


Figure 4.26: Caregiver Approval Interface

Retirement Home Approval

Similarly, retirement homes must go through an approval process before they can offer services on our platform. The administrator reviews the facility's location, contact information, and the specific care services they provide. This step ensures that all institutions on ONS meet our quality and safety standards.

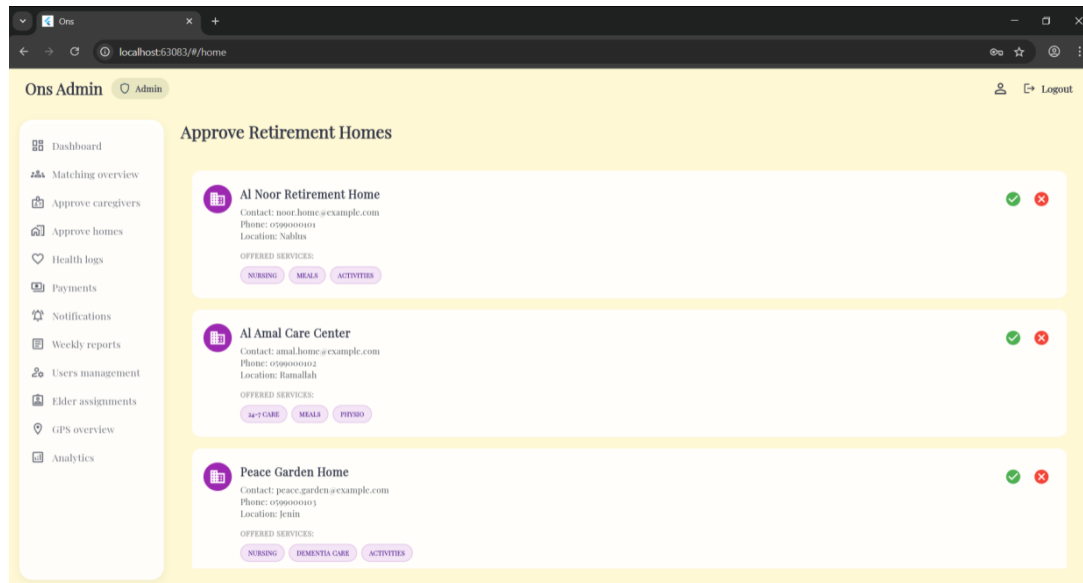


Figure 4.27: Retirement Home Approval Interface

Matching Requests Management

This part of the system handles the final step in connecting families with care providers. After a family selects a caregiver or retirement home, the request is sent to the administrator for a final check. Rather than just automating the process, we included this step as a form of quality control. The admin reviews compatibility scores, locations, and specific preferences to make sure the match is truly appropriate for the senior's needs.

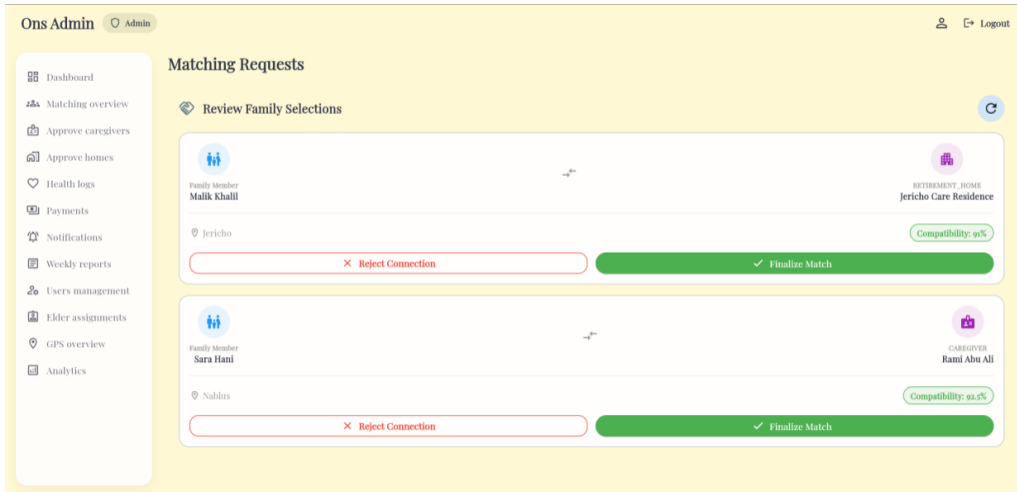


Figure 4.28: Matching requests review

Payments and Financial Management

To maintain financial transparency, we built a management tool to track all transactions. Administrators can monitor total revenue, platform fees, and payouts to caregivers. The interface includes filters so that admins can easily search for payments by date or status, ensuring that everyone gets paid correctly and on time.

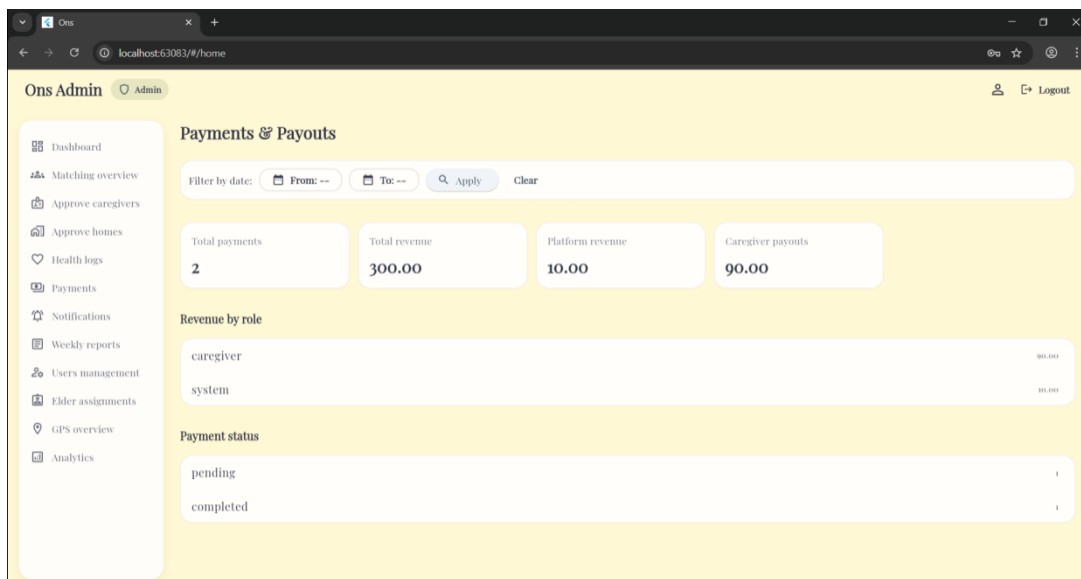


Figure 4.29: Payments and Payouts Overview

Health Logs Monitoring

Administrators can also view combined health data for all seniors on the platform. This screen displays vital signs like blood pressure, heart rate, and blood sugar levels. We included advanced filters so that admins can quickly spot "red flags" or abnormal readings, which helps in coordinating a fast response to potential health risks.

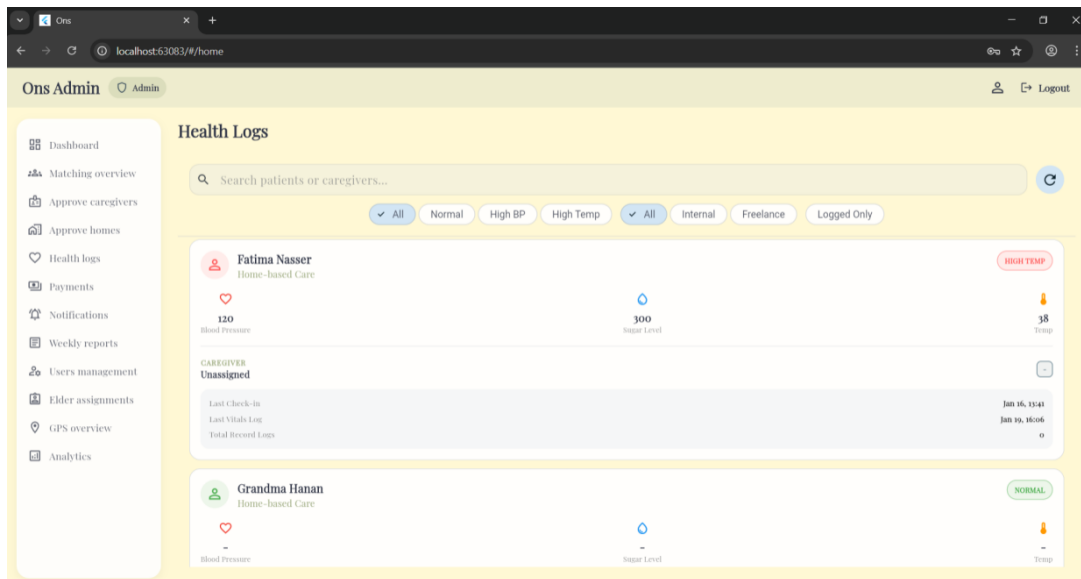


Figure 4.30: Health Logs Monitoring Interface

Notifications and Alerts

The notification module is where administrators manage system alerts, particularly those related to health emergencies. Alerts are organized by how serious they are and whether they have been resolved yet. This allows administrators to check the details of an incident, see which senior is affected, and close the alert once the situation has been handled.

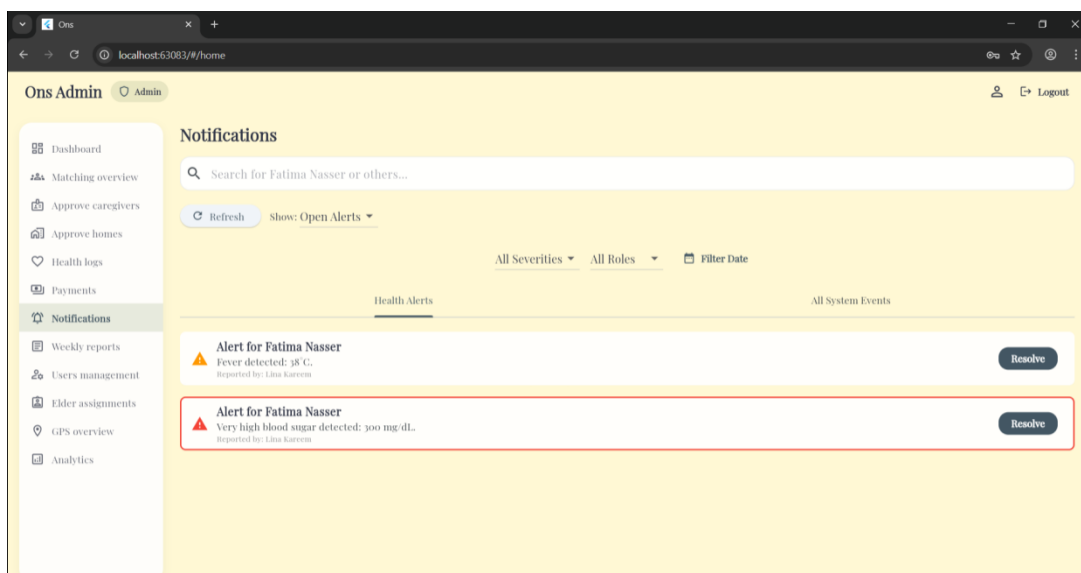


Figure 4.31: Health Alerts and Notifications Management

Weekly Reports Management

The Weekly Reports module allows administrators to track the care provided to each senior. Caregivers are required to submit a structured summary every week, detailing

their observations, the care they delivered, and any necessary follow-up actions.

To keep things organized, the interface includes filters for caregivers and date ranges. Each entry clearly displays the senior's name, the assigned caregiver, the time period covered, and exactly when the report was submitted. This ensures that care standards are being met and makes it easy to find specific records when needed.

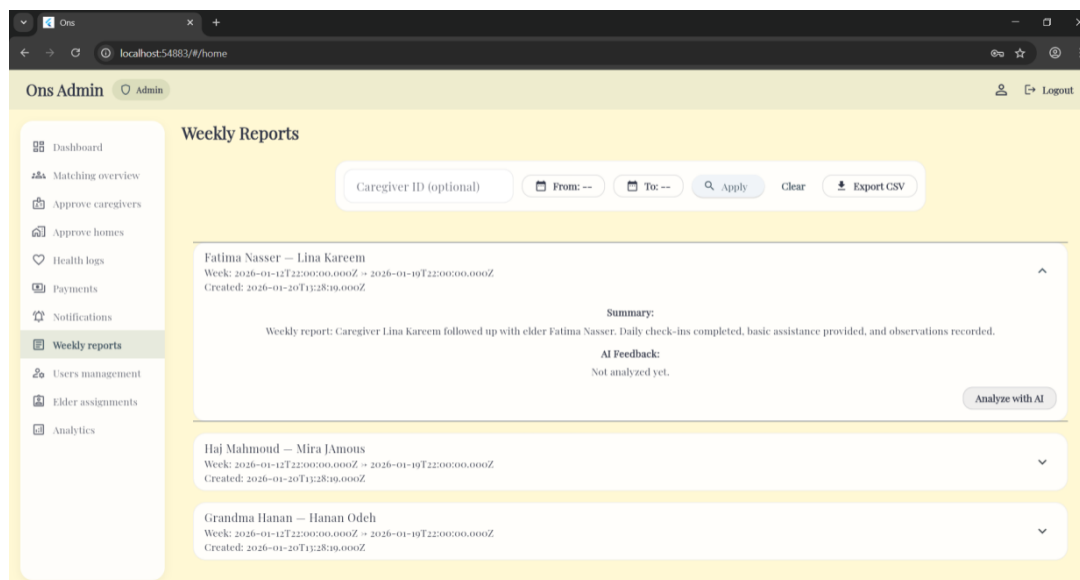


Figure 4.32: Weekly reports management interface for administrators

User Management

The user management interface acts as a central directory for the entire ONS platform. Administrators can use this tool to see a list of everyone registered from seniors to health-care staff. It allows them to monitor who is currently active and filter users based on their roles. This is essential for keeping the platform organized and making sure that only verified users have access to sensitive information.

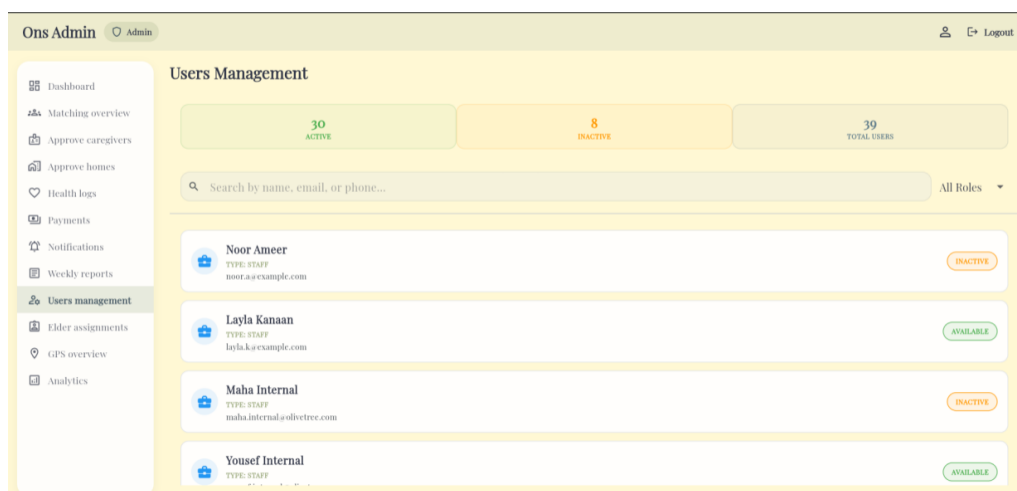


Figure 4.33: User management interface

Elder Assignments

In this section, administrators can track all active care relationships. It provides a clear view of which caregiver or retirement home is looking after which senior. By having a dedicated space for these assignments, the admin can easily verify care settings and ensure that no senior is left without the support they need.

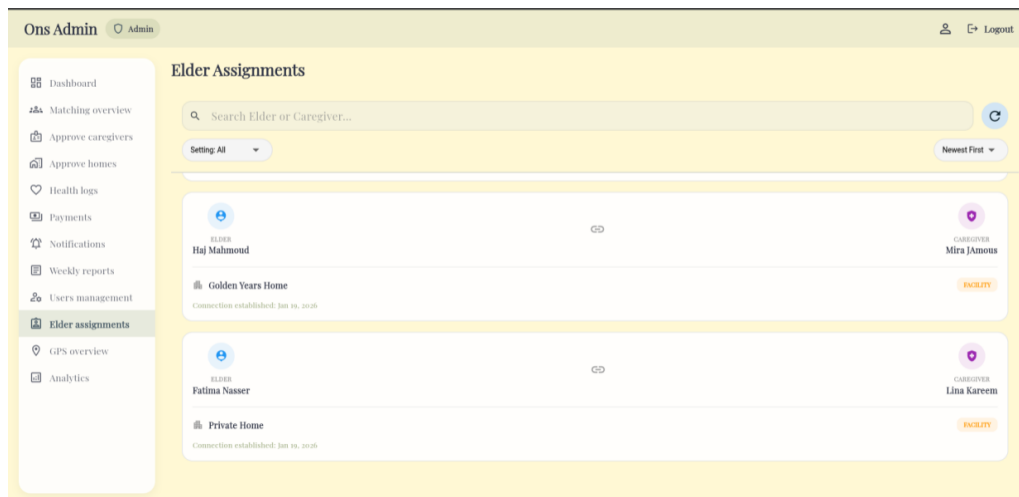


Figure 4.34: Elder assignments overview

Analytics and System Statistics

The Admin Analytics module is designed to give administrators a "big picture" view of how the platform is growing and being used. Instead of looking at individual records, this section allows admins to track the system's overall health and activity through clear, summarized data. This makes it much easier to make data-driven decisions about the platform's operations.

The analytics dashboard highlights key numbers, such as the total count of registered caregivers, families, seniors, and retirement homes. It also tracks more specific details, like the number of currently active caregivers, pending approvals, and whether seniors have been successfully assigned to a care provider. Additionally, admins can monitor the volume of weekly reports being submitted. These metrics are vital for spotting trends and identifying which parts of the system might need more attention or resources.

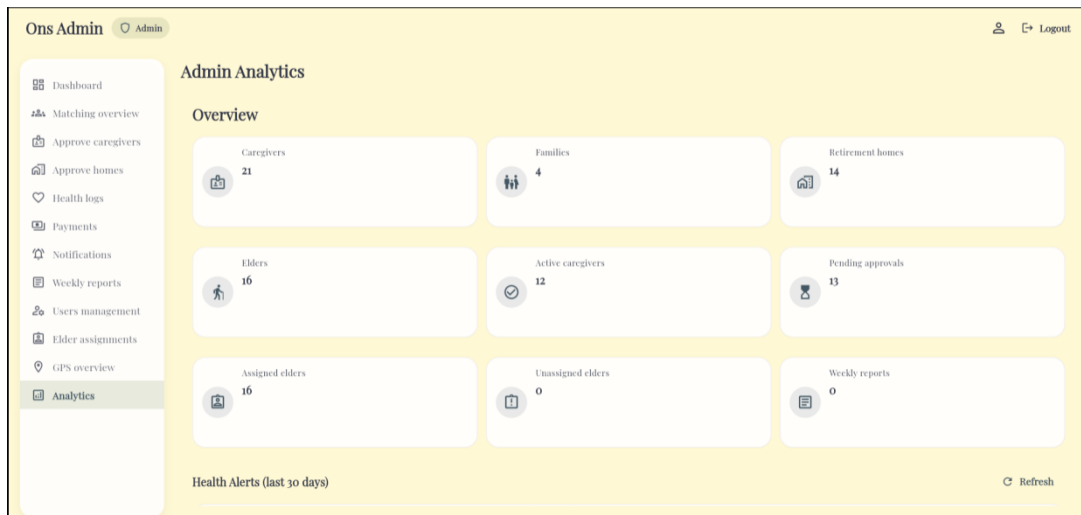


Figure 4.35: Admin analytics dashboard overview

4.2.2 Caregiver Module

The caregiver module enables caregivers to manage their assigned elders, perform daily care activities, record health data, manage medications, report incidents, and communicate with families. The module supports both internal caregivers and freelancers.

Caregiver Authentication

To start their day, caregivers log in by selecting their specific role and entering their credentials. Once the system verifies them, they are taken directly to their personalized dashboard to begin managing their tasks.

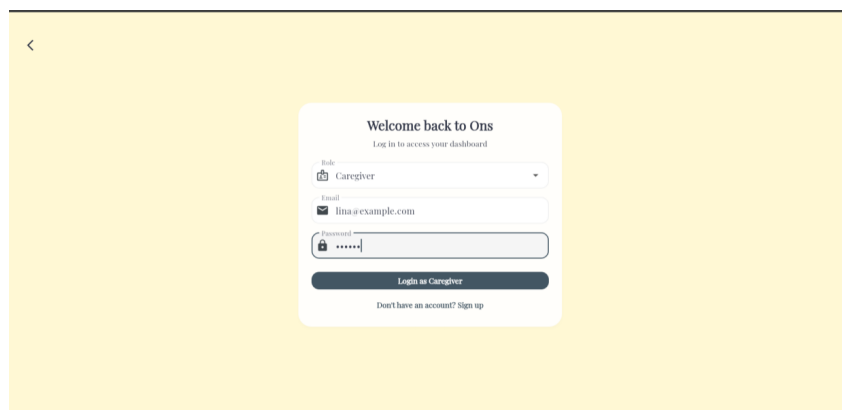


Figure 4.36: Caregiver login interface

Caregiver Profile Management

Each caregiver has a personal profile that stores essential professional and contact information. The profile includes details such as phone number, city, skills, availability, and

work status. Caregivers can update this information at any time, ensuring that families and administrators always have accurate and up-to-date data.

This profile management feature supports better matching, clearer communication, and more reliable care coordination across the platform.

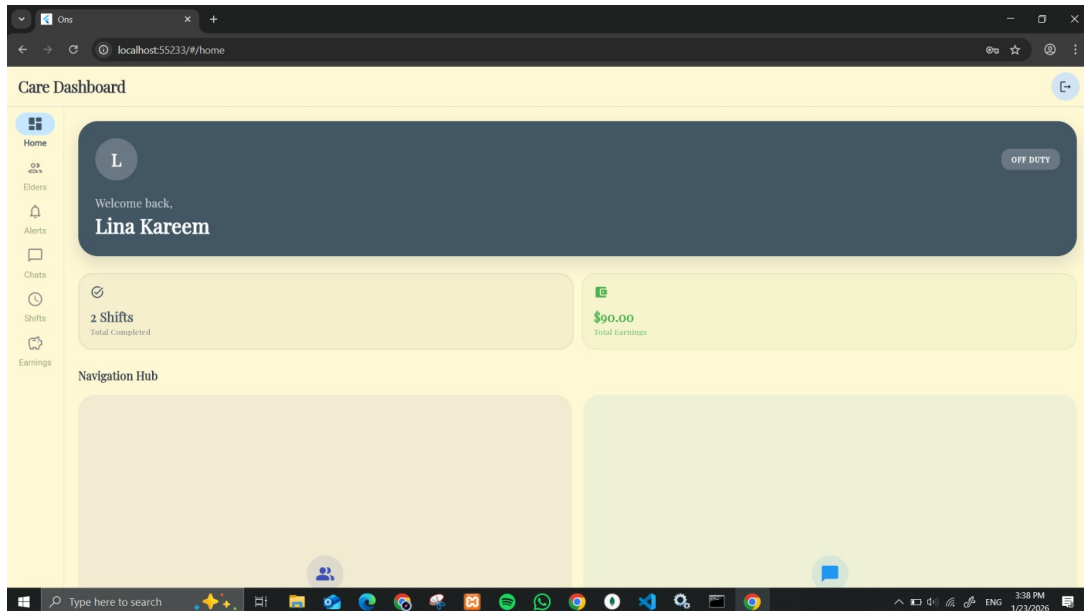


Figure 4.37: Caregiver profile editing interface

Caregiver Dashboard

The caregiver dashboard acts as the main control center of the system. It provides a clear overview of the caregiver's current status, including whether they are on duty, how many shifts they have completed, and their total earnings.

The dashboard also serves as a navigation hub, allowing quick access to elders, alerts, messages, shifts, and earnings. This design helps caregivers respond efficiently to daily tasks and urgent situations.

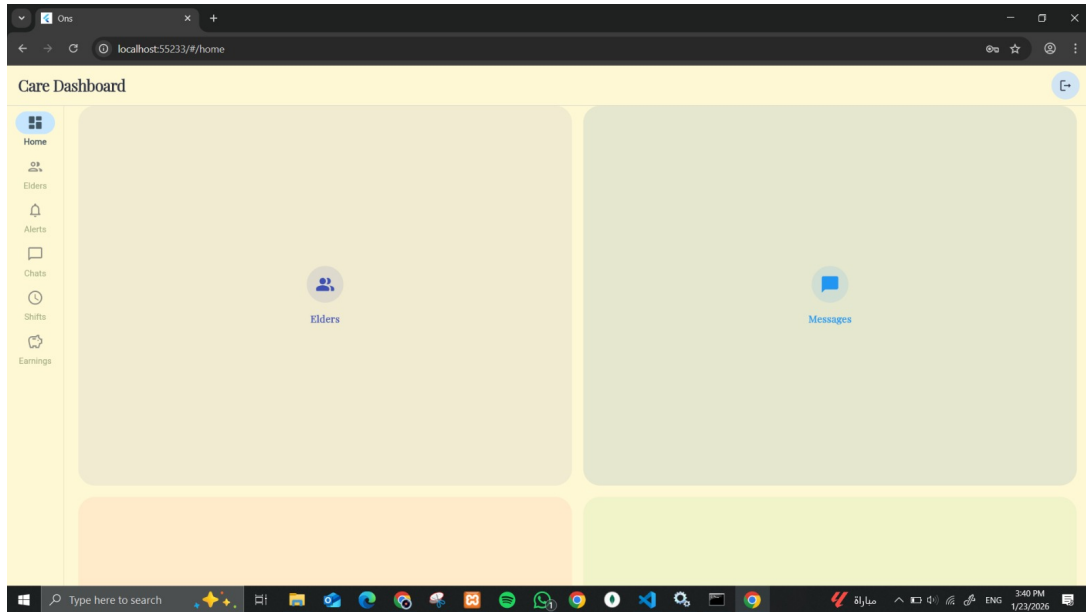


Figure 4.38: Caregiver dashboard overview

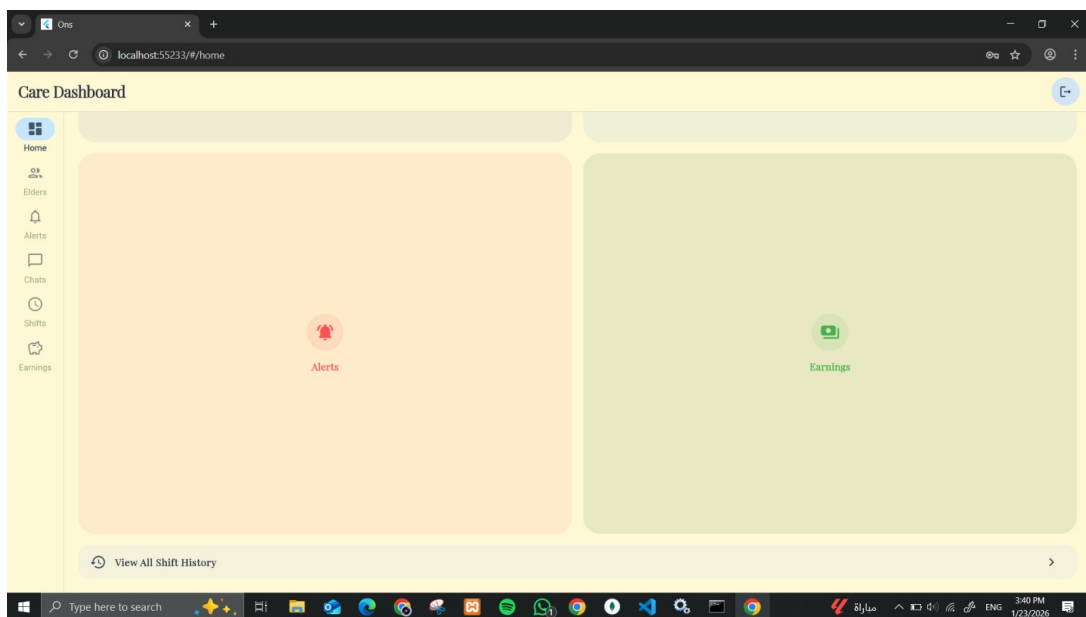


Figure 4.39: Caregiver dashboard navigation tiles

Elder Management

The Elders section lists all seniors assigned to the caregiver. Each elder card displays basic information such as name, age, gender, and last check-in time. By selecting an elder, the caregiver can access a comprehensive profile with multiple care-related features.

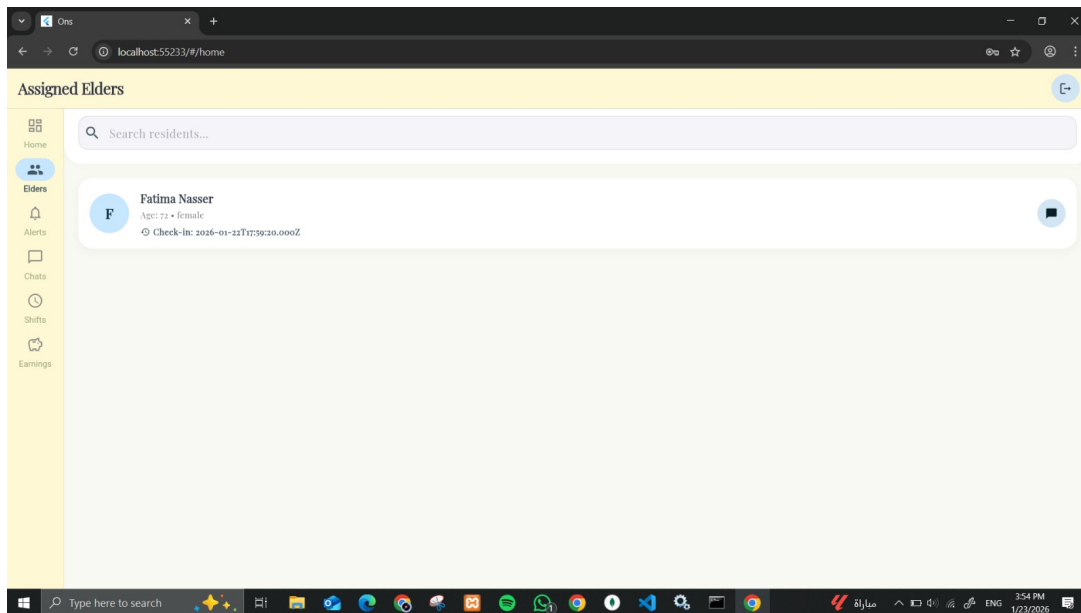


Figure 4.40: Assigned elders list

Elder Overview and Check-in The overview tab displays the elder’s basic information and last check-in time. Caregivers can perform daily check-ins directly from this screen, ensuring continuous monitoring and accountability during visits.

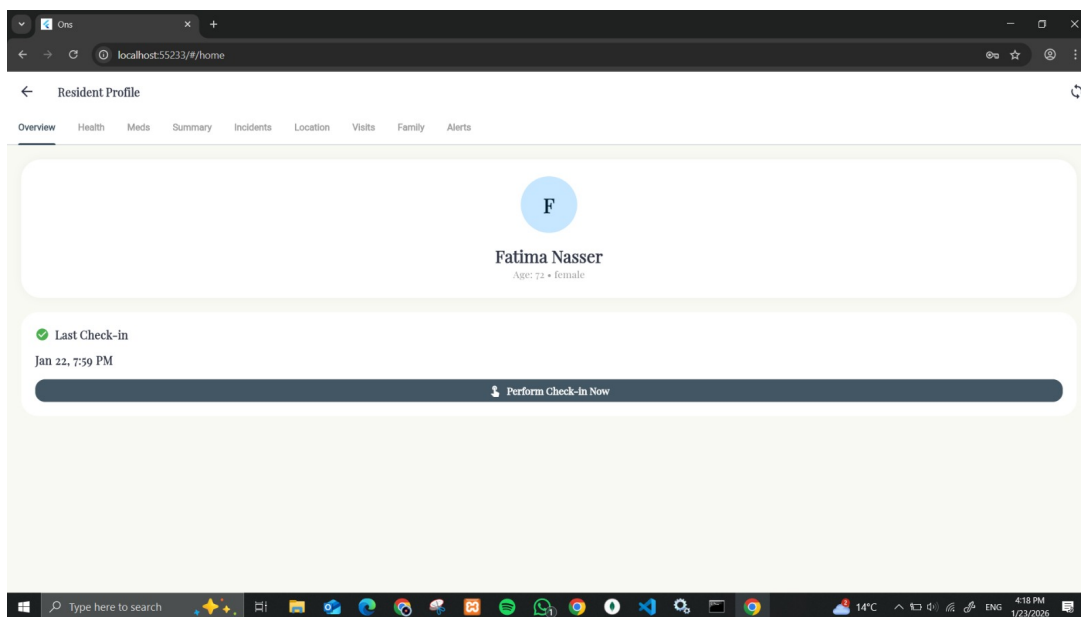


Figure 4.41: Elder overview and check-in interface

Health Logs The health logs screen allows caregivers to record and review vital signs such as blood pressure, blood sugar, body temperature, and heart rate. This historical data supports early detection of abnormal conditions and enables better medical follow-up.

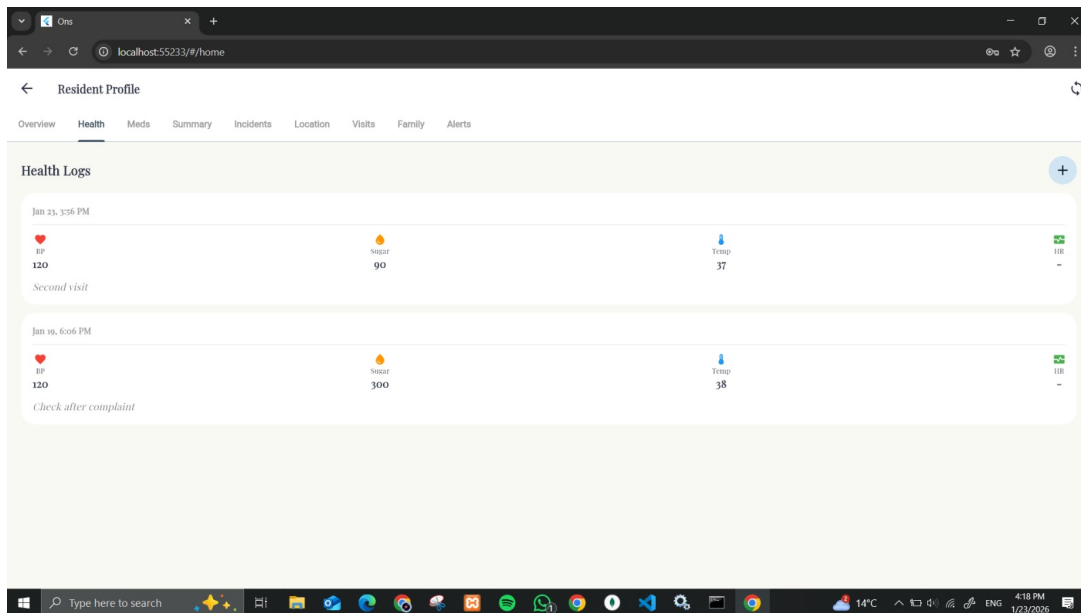


Figure 4.42: Health logs and vital signs history

Medication Management This interface displays the elder’s medication plan, including dosage, frequency, and instructions. A daily checklist enables caregivers to mark medications as taken, missed, or skipped, reducing medication errors and improving adherence.

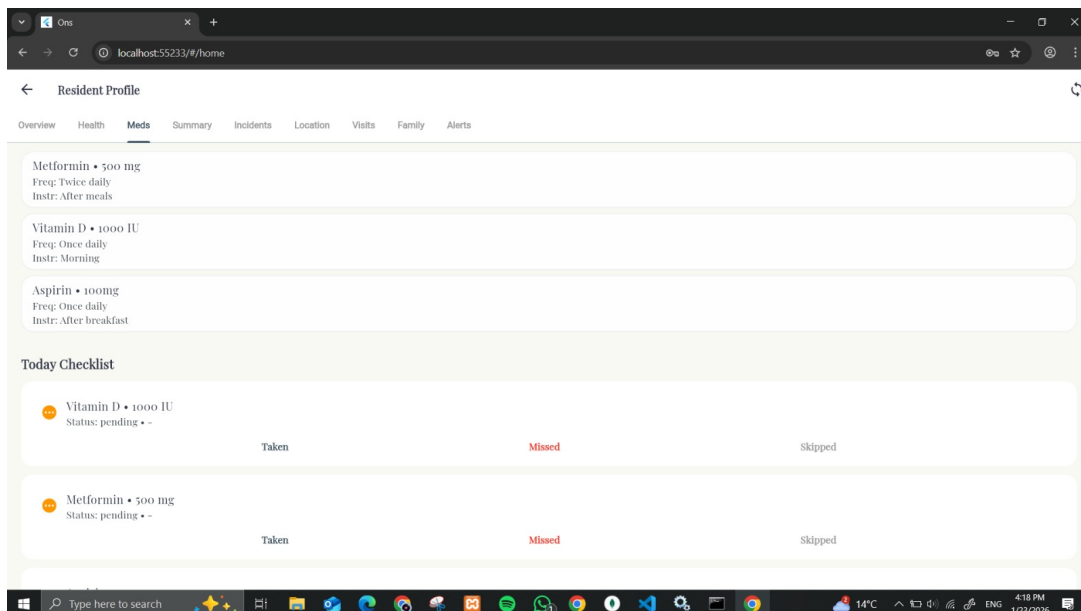


Figure 4.43: Medication plan and daily checklist

Daily Summary and Incidents Caregivers can record a daily summary that includes mood, meals, activities, sleep duration, and notes. Additionally, incidents such as falls or discomfort can be documented, creating a complete daily care record accessible to families and administrators.

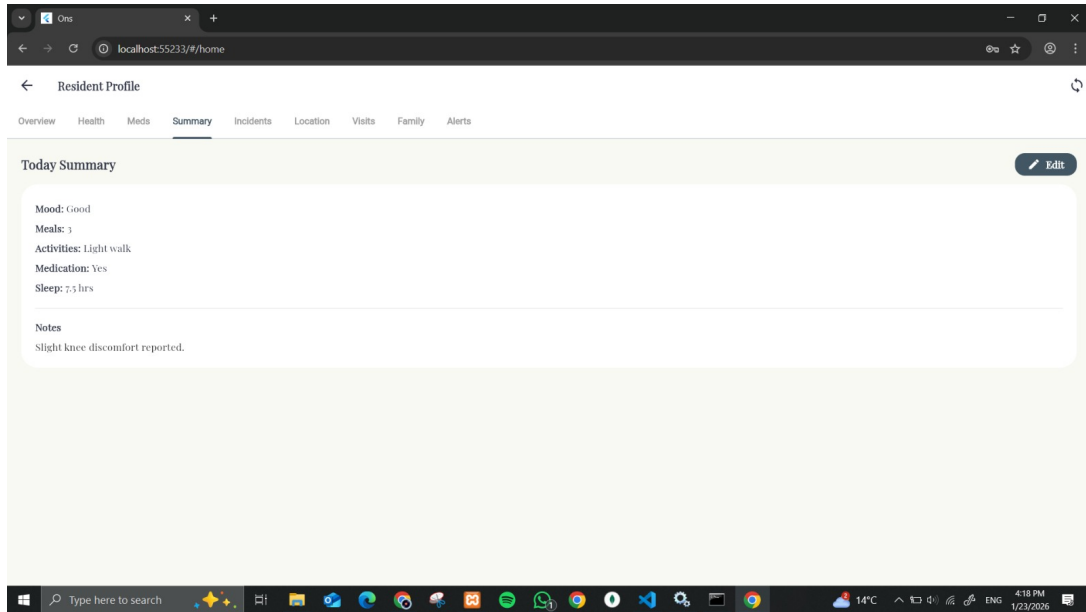


Figure 4.44: Daily summary and incident reporting

Location Tracking The location tab displays the elder’s recent location history on a map. This feature helps ensure safety, verify visits, and support emergency response when needed.

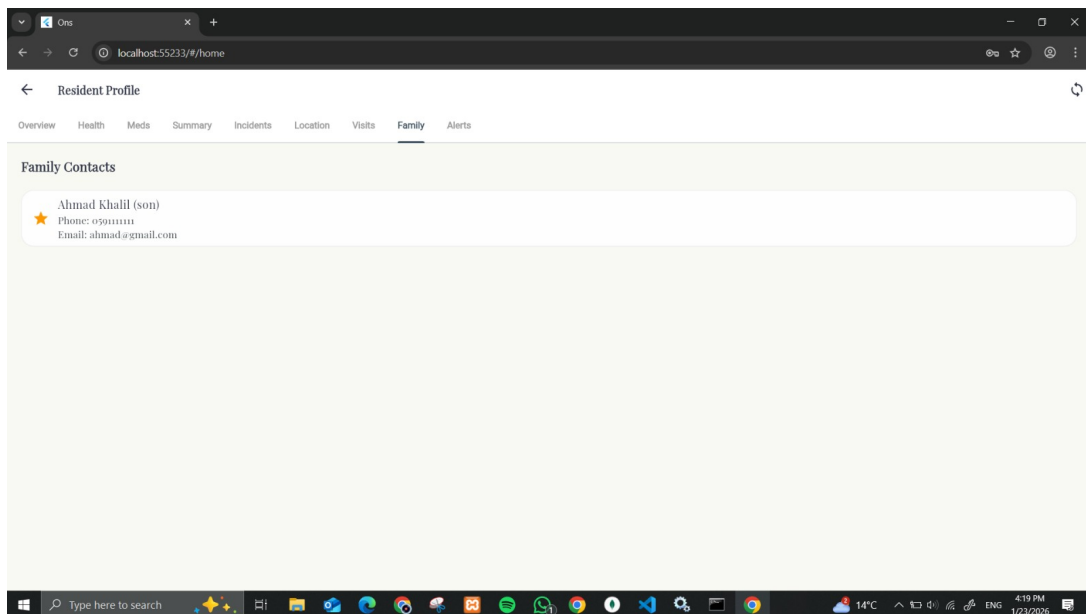


Figure 4.45: Elder location history and map view

Family Contacts This section provides quick access to the elder’s family contacts, including phone numbers and email addresses. A primary contact can be highlighted to facilitate fast communication during emergencies.

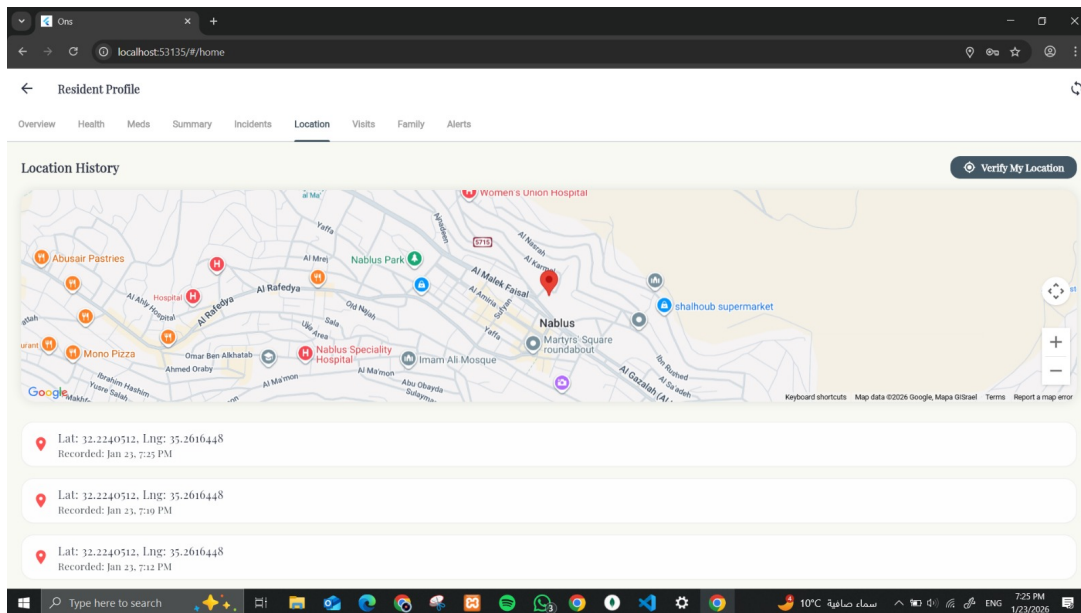


Figure 4.46: Family contact information

Health Alerts and Emergency Notifications

The alerts module notifies caregivers in real time when abnormal health readings are detected. Alerts are clearly labeled by severity, such as warning or critical, allowing caregivers to prioritize responses and act quickly.

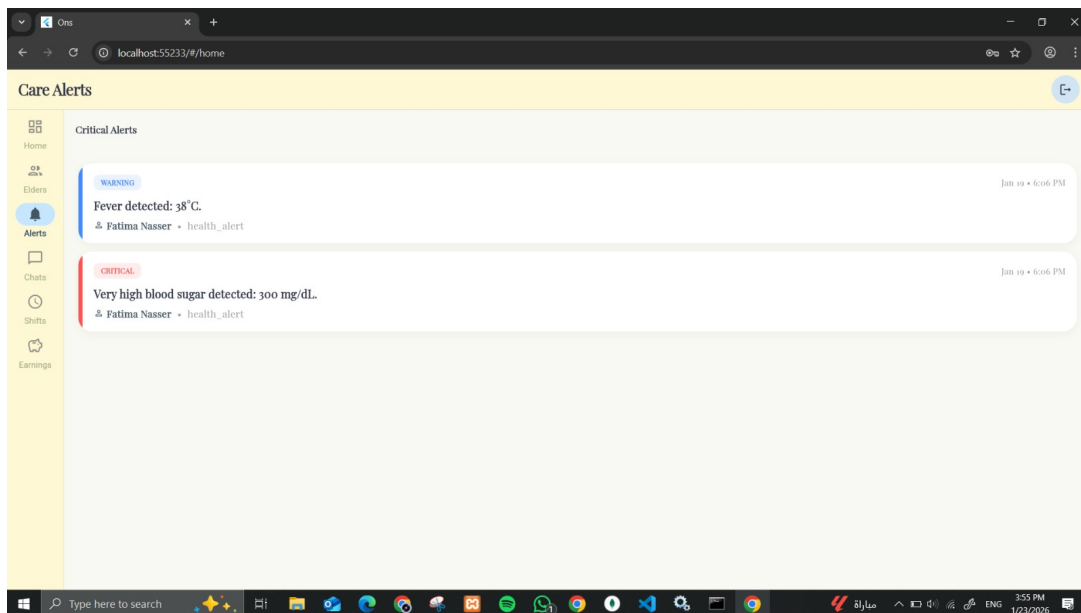


Figure 4.47: Caregiver health alerts view

Communication and Chat System

The chat feature enables direct messaging between caregivers and family members. This ensures continuous communication, quick updates, and better coordination of care.

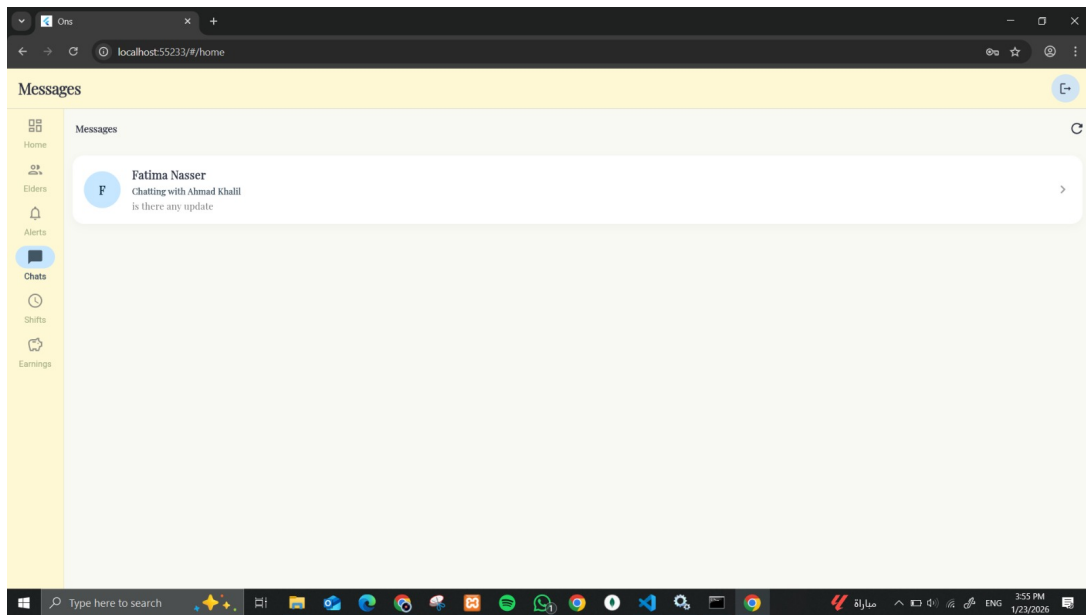


Figure 4.48: Messages list

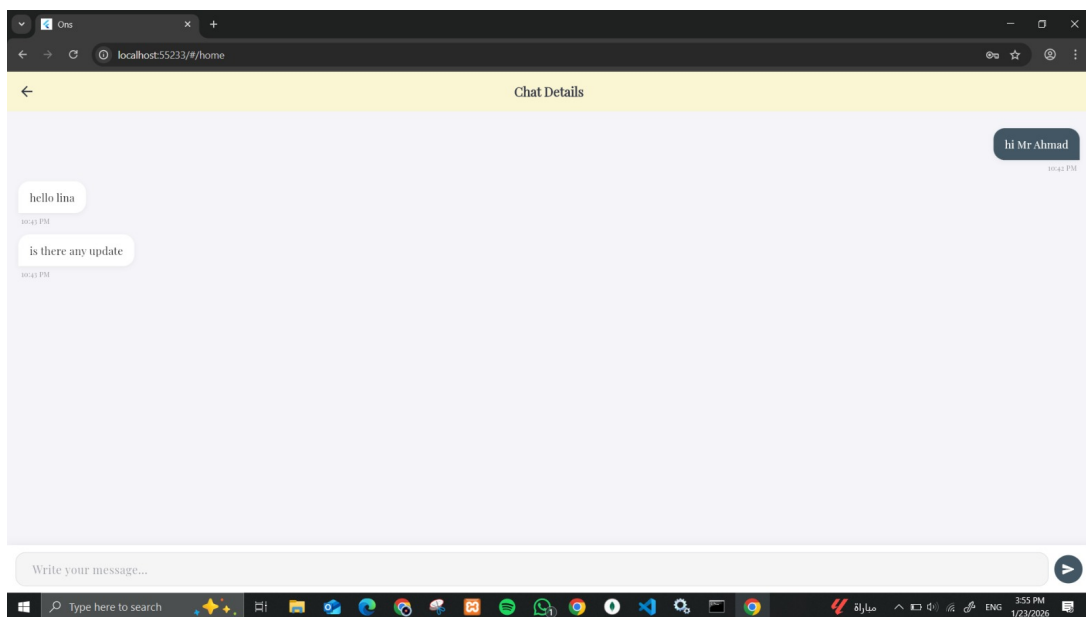


Figure 4.49: Chat conversation interface

Shift Management

Caregivers can manage their working hours through the shift system. They can start and end shifts directly from the application, and view a complete history of previous shifts along with notes.

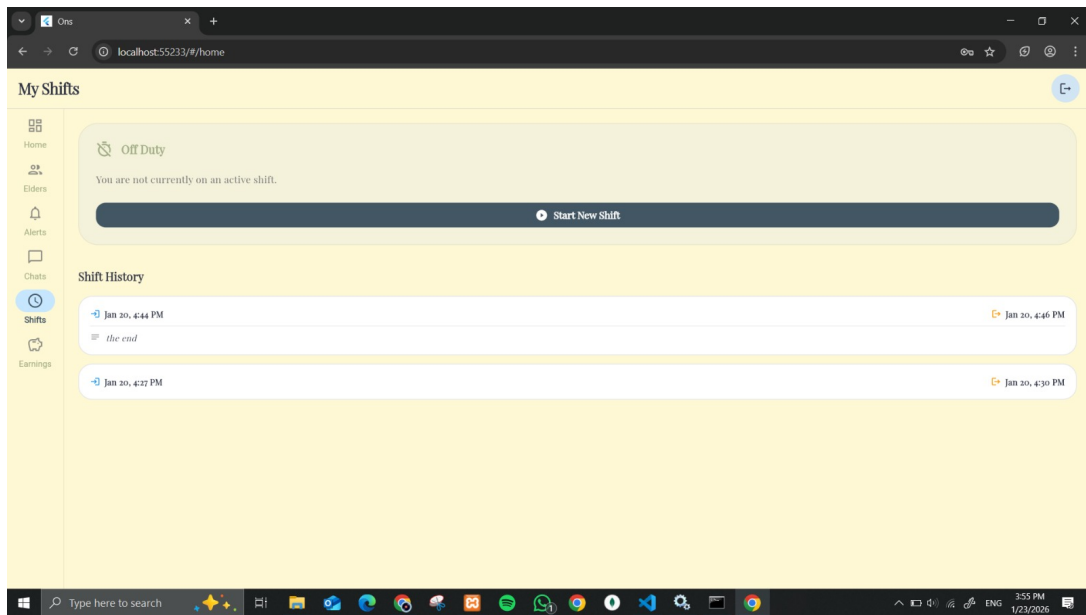


Figure 4.50: Shift management and history

Earnings and Payments

The earnings module provides caregivers with a transparent view of their income. It displays the available balance and a detailed transaction history, including payment source, amount, and timestamp.

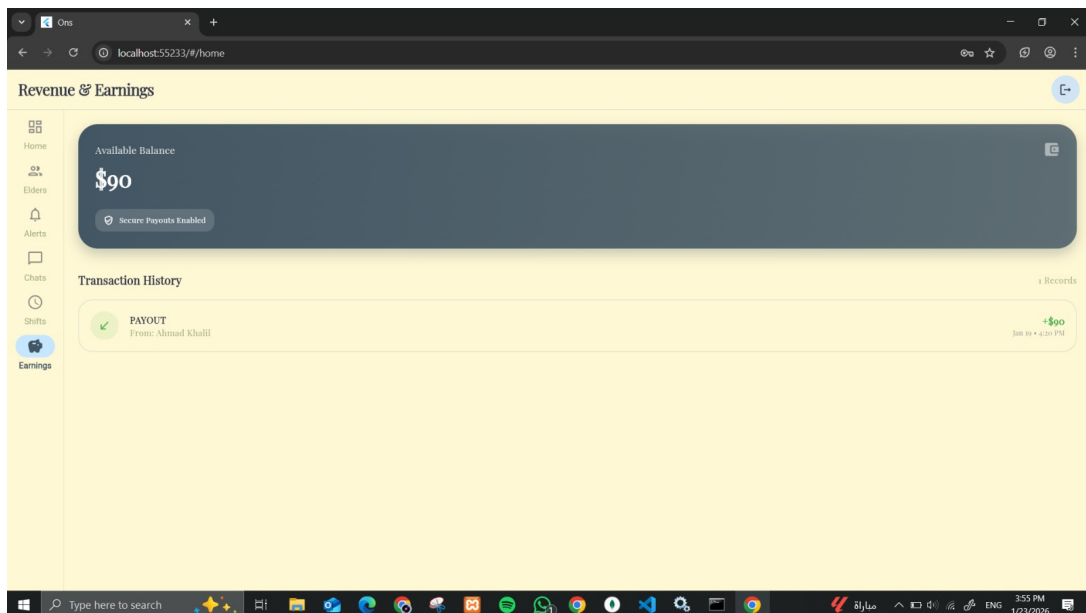


Figure 4.51: Earnings summary and transaction history

4.2.3 Family Module

The Family module is designed to give family members peace of mind by allowing them to monitor their elderly relatives, communicate with caregivers, receive alerts, manage

payments, and control care preferences from one unified interface.

Family Dashboard

The family dashboard is designed to give family members peace of mind by presenting a high-level overview of their loved ones' status. It provides quick access to elder management, messages, alerts, and important updates, allowing families to monitor care without needing technical knowledge.

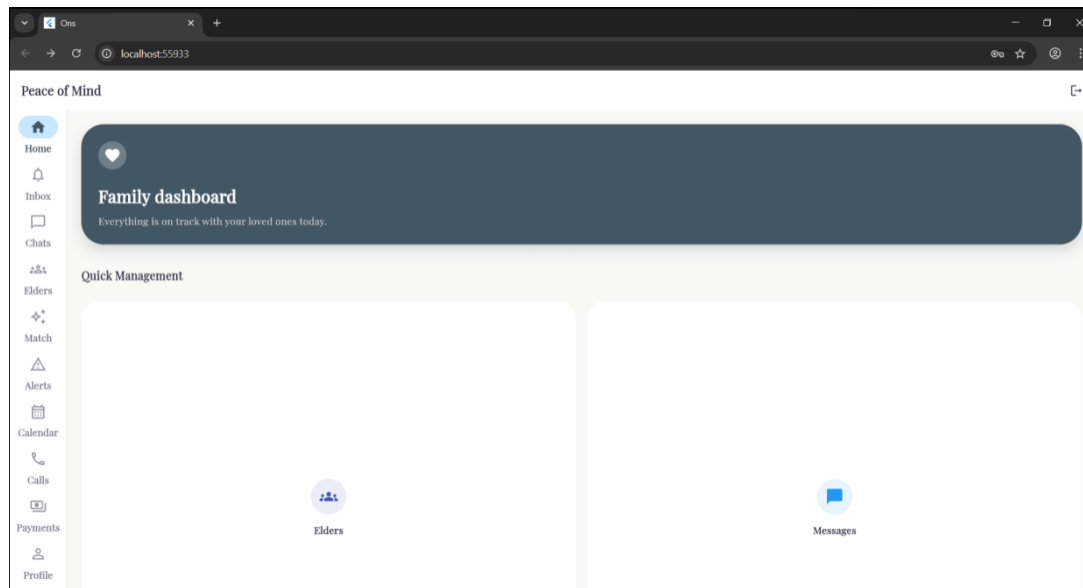


Figure 4.52: Family dashboard overview

Elder List and Management

This screen displays all elders linked to the family account. Each elder card includes basic information such as name, age, and relationship. From this list, family members can access detailed elder profiles, communicate with caregivers, and review care activities.

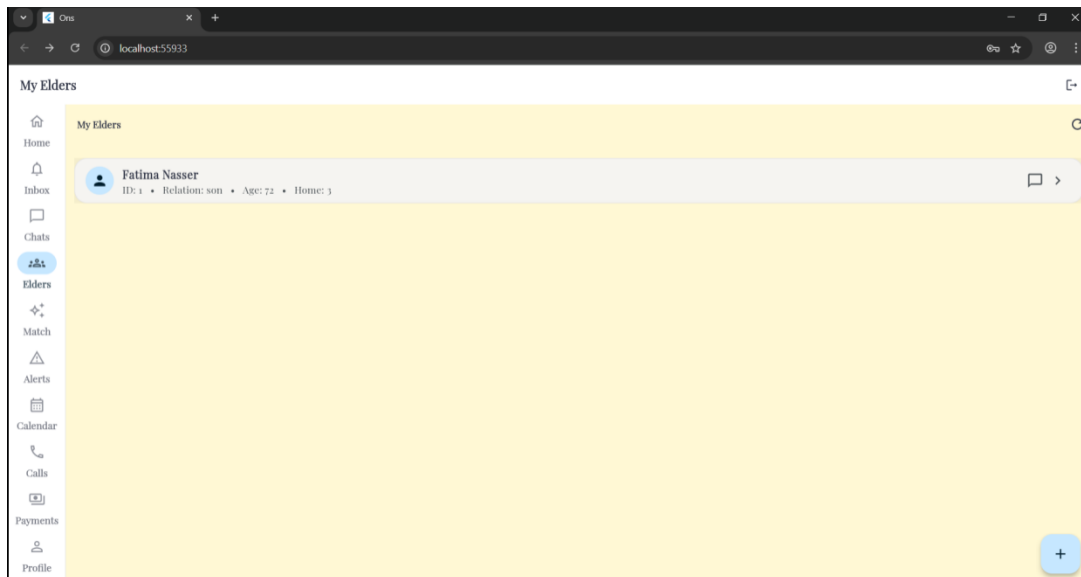


Figure 4.53: Family view of linked elders

Elder Profile and Monitoring Once an elder is selected, the family can access a detailed profile that centralizes all health and care-related information. This design ensures transparency and keeps family members informed about the elder’s daily condition.

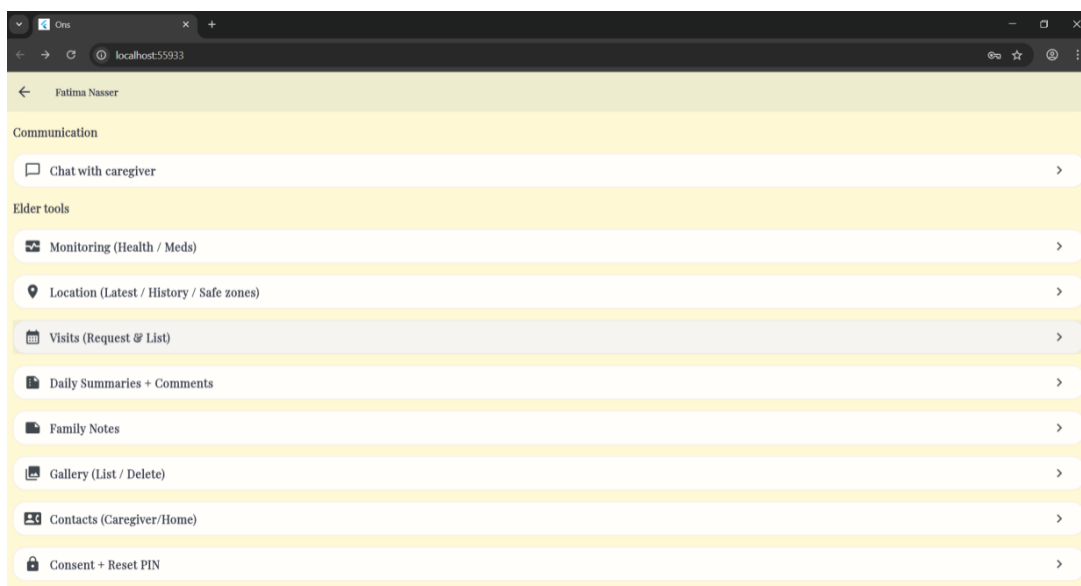


Figure 4.54: Elder tools and management options

Safety Alerts

Families receive real-time alerts related to emergencies, abnormal health readings, or safety incidents. Alerts are categorized by severity (low, medium, high, critical) to help families understand urgency and respond appropriately.

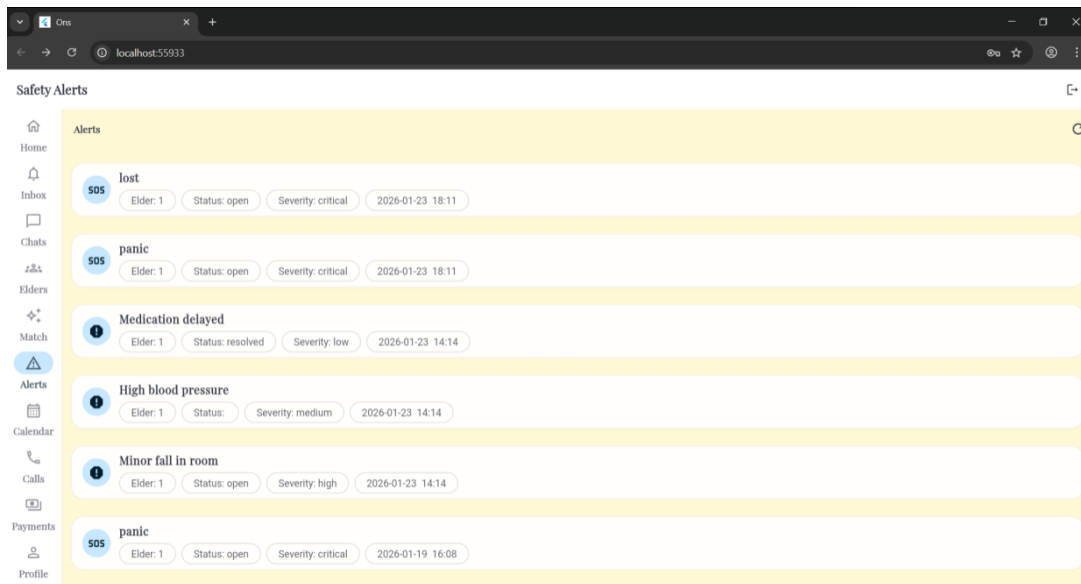


Figure 4.55: Family safety alerts overview

Voice Calls

The calls module allows family members to request and review voice calls with elders, caregivers, or retirement homes. Families can initiate calls, specify the target role, and view call history with timestamps and call status.

This feature supports urgent communication when text messaging is not sufficient.

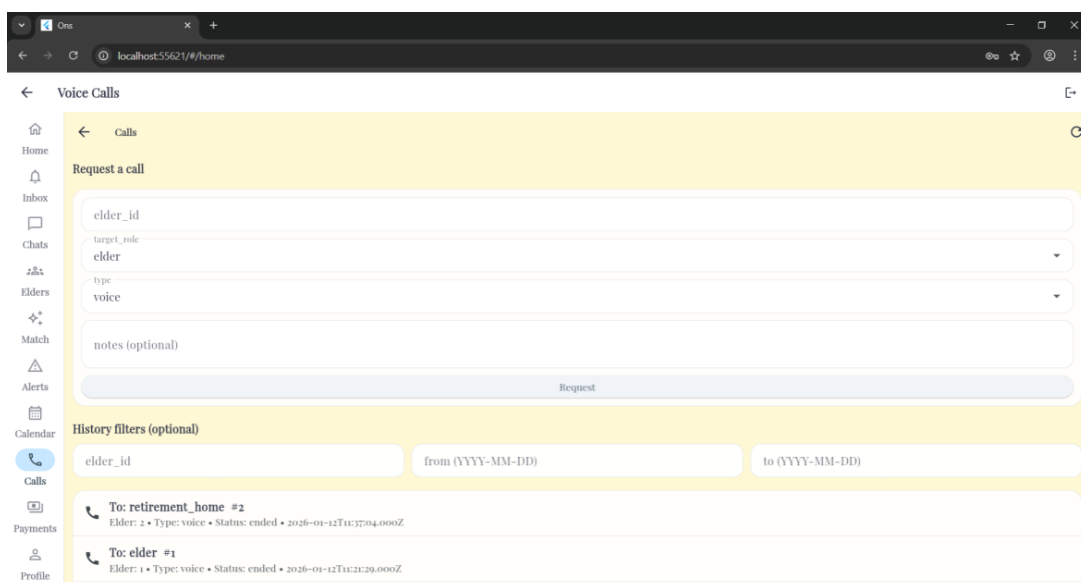


Figure 4.56: Voice call requests and history

Calendar and Scheduling

The calendar module provides a timeline of all elder-related events such as doctor visits, family visits, and reminders. Family members can filter events by date or elder, helping

them stay informed and involved in care planning.

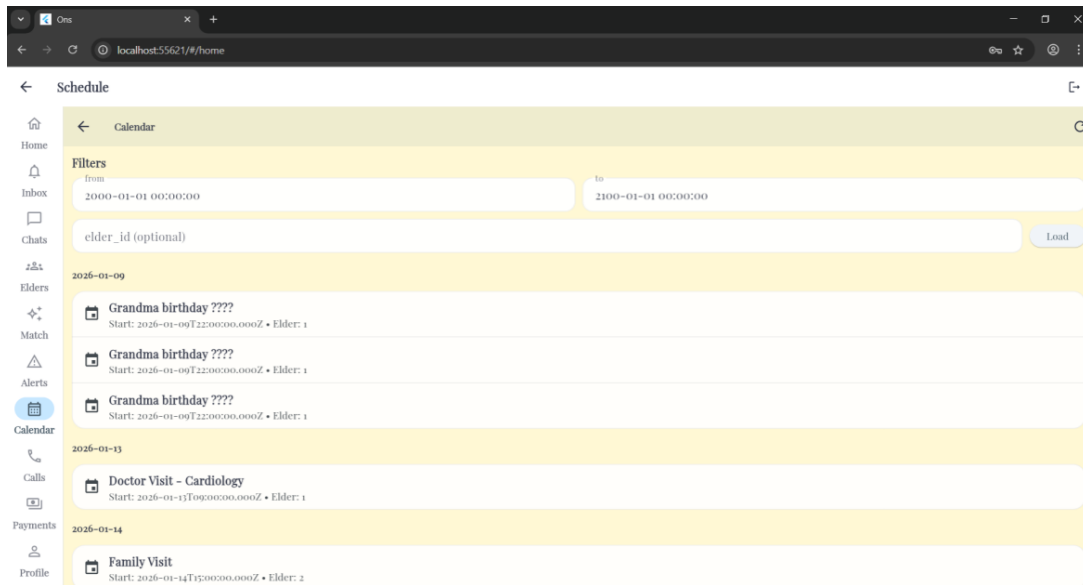


Figure 4.57: Family calendar and scheduled events

Payments Management

The Payments section allows family members to manage financial transactions related to caregiving and retirement homes. Users can initiate payments, choose payment methods, and review payment history, ensuring transparency and accountability.

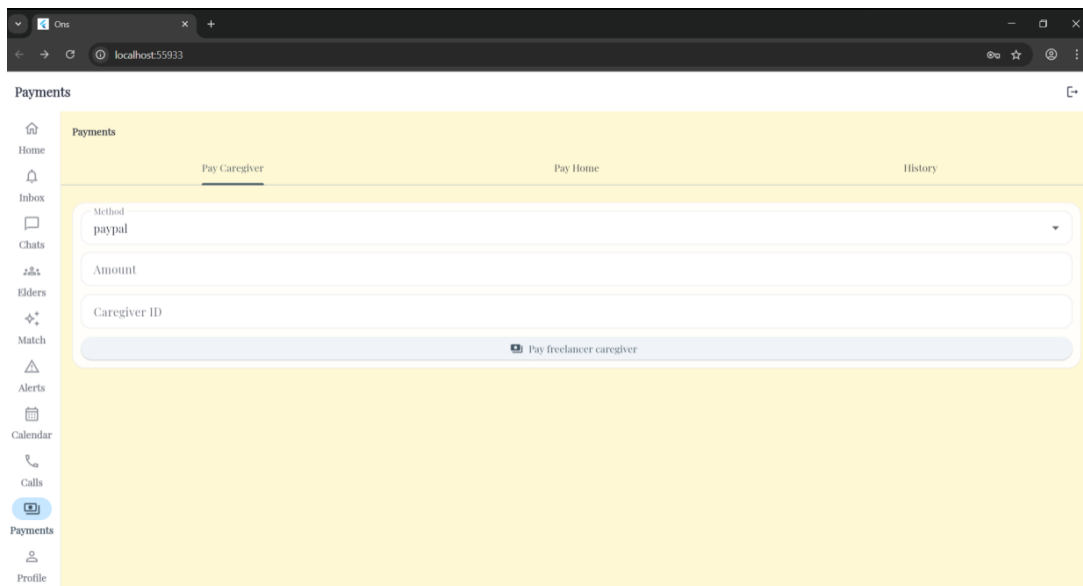


Figure 4.58: Payments and transaction management

Communication with Caregivers

The communication module allows families to chat directly with caregivers. This feature improves coordination, enables quick updates, and strengthens trust between families and

care providers.

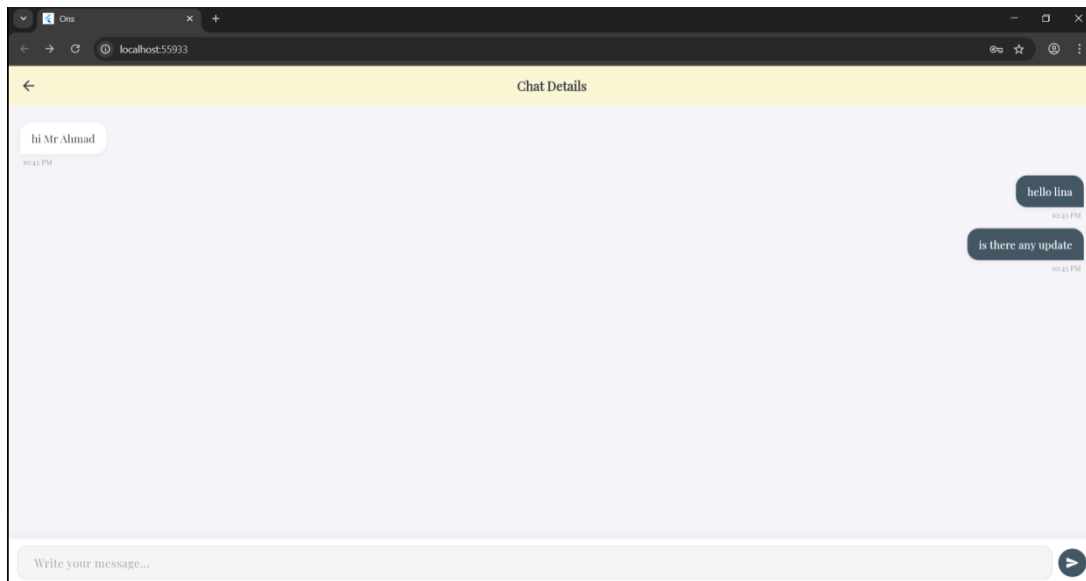


Figure 4.59: Family–caregiver chat interface

Family Profile Management

Family members can manage their personal information, preferences, budget, and care requirements through the profile screen. This information is used by the smart matching system to recommend suitable caregivers or retirement homes.

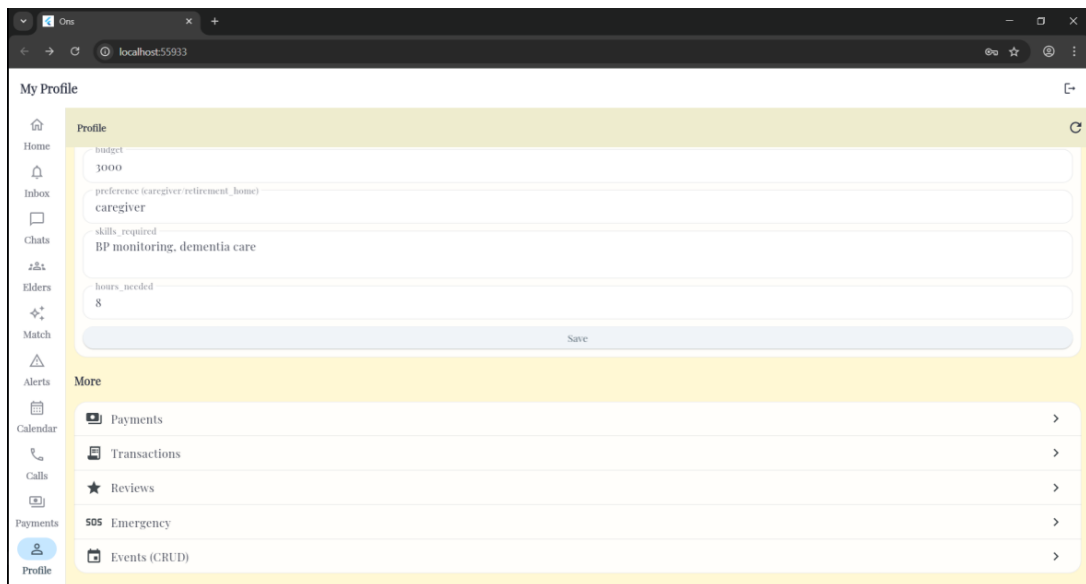


Figure 4.60: Family profile management

Smart Matching

The Smart Matching feature helps families find suitable caregivers or retirement homes based on their profile information, location, budget, and required skills. The system ranks

results using a matching score and allows families to assign a caregiver directly from the results list.

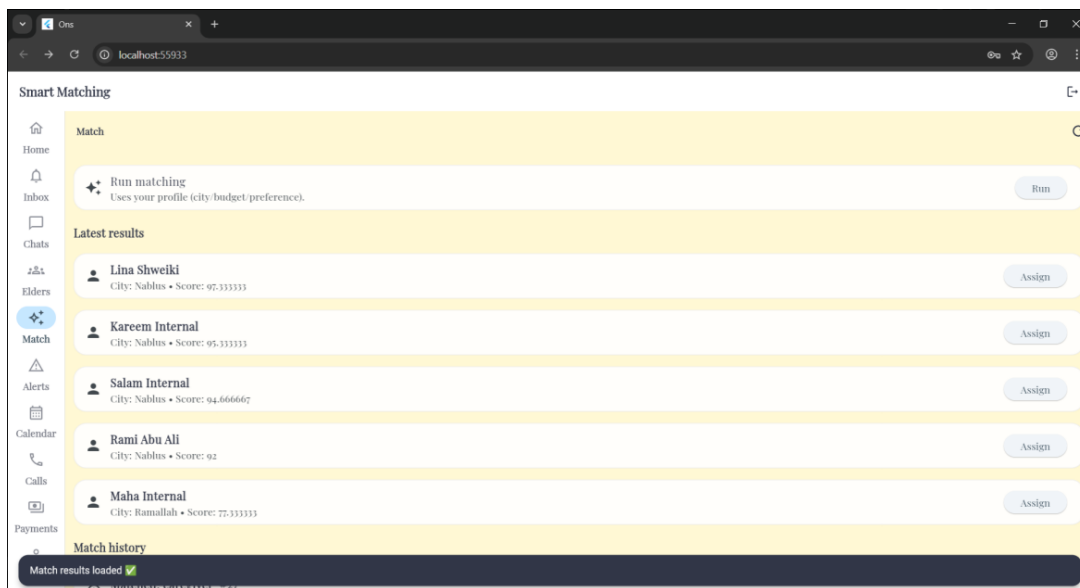


Figure 4.61: Smart matching results for caregivers

Here is the rewrite for the Elders Module. I have simplified the language to a natural B2 level, focusing on how the design specifically helps seniors feel more independent and safe.

4.2.4 Elders Module

The Elders module is the heart of the ONS platform. Since many seniors find technology overwhelming, we designed this section to be as simple and accessible as possible. It uses large buttons, clear navigation, and high-contrast colors. The focus is on helping seniors manage their health, stay connected with loved ones, and maintain their independence while staying safe.

Elder Dashboard

After logging in, the user sees a clean dashboard that highlights the most important daily services. We kept the layout distraction-free so they can quickly find what they need, such as medication reminders, the AI companion, or emergency help. Less frequent services, like the gallery or privacy settings, are also easy to reach from the same screen.



Figure 4.62: Elder dashboard

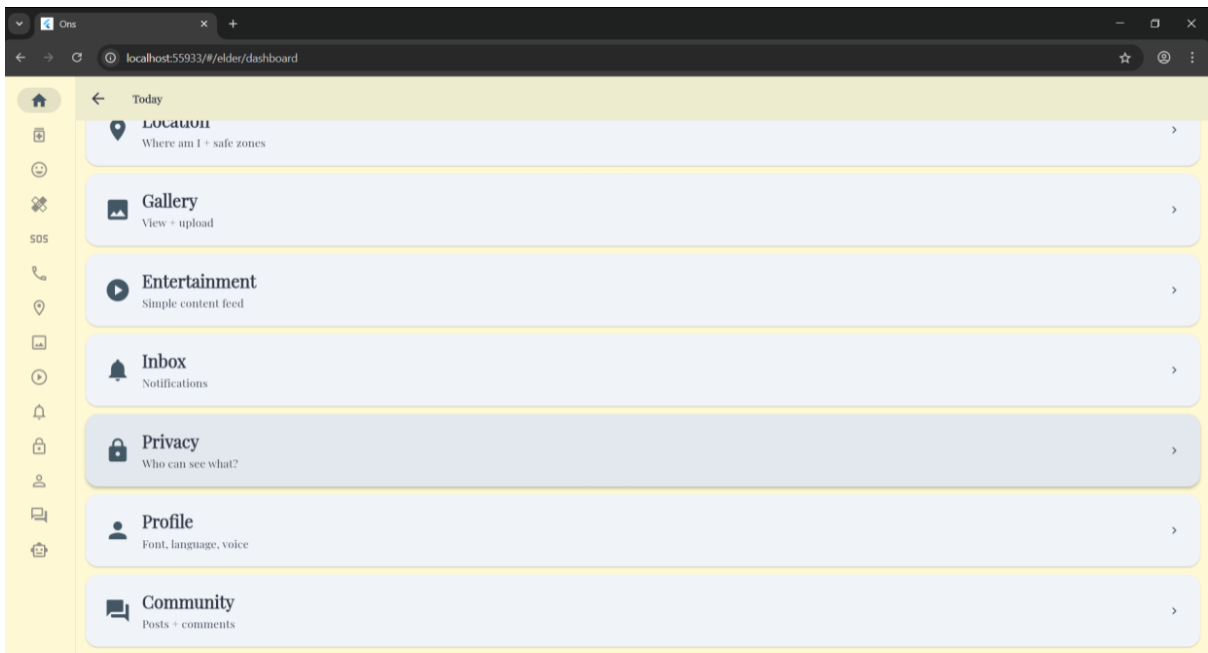


Figure 4.63: Elder dashboard (additional services)

Medicines (Daily Schedule and Confirmation)

To help seniors keep track of their prescriptions, the Medicines screen shows a clear list for the day. It includes the name of the medicine, the dose, and the time it should be taken. By clicking a single "Taken" button, the elder confirms they have followed their schedule. This simple action helps prevent missed doses and automatically updates the family and caregivers.

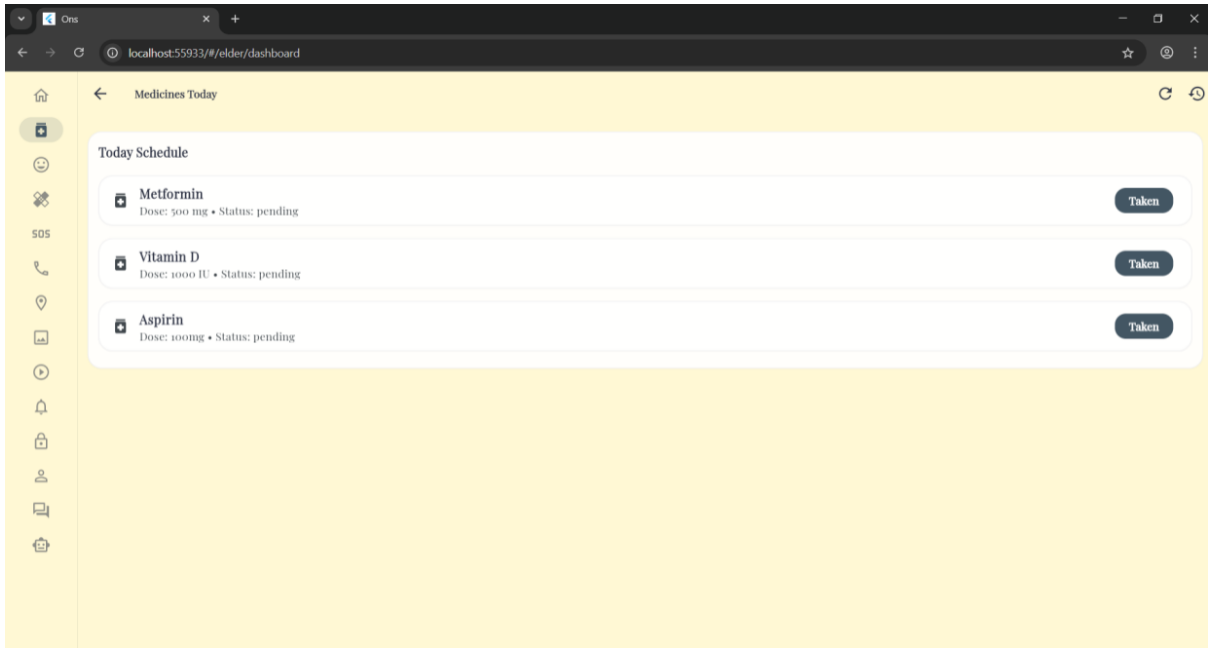


Figure 4.64: Medicines screen showing today's schedule

Mood Tracking

Mental health is just as important as physical health. The Mood Tracking feature lets seniors record how they feel using a simple rating scale. They can also add a short note if they wish. This provides a quick daily check-in that helps families spot any emotional changes over time.

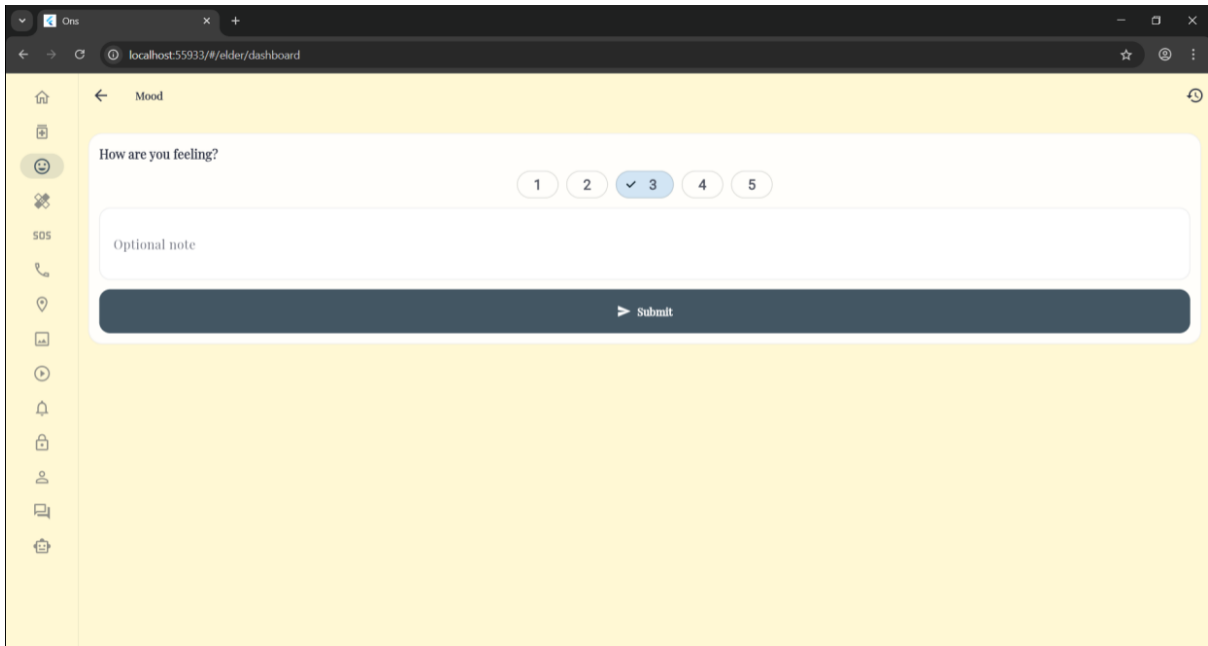


Figure 4.65: Mood tracking screen

Symptoms Reporting

If a senior feels unwell, they can use the Symptoms feature to report the issue immediately. They simply select the severity of the problem and describe what is wrong. This ensures that caregivers get structured, accurate information quickly, rather than waiting for a phone call or a visit.

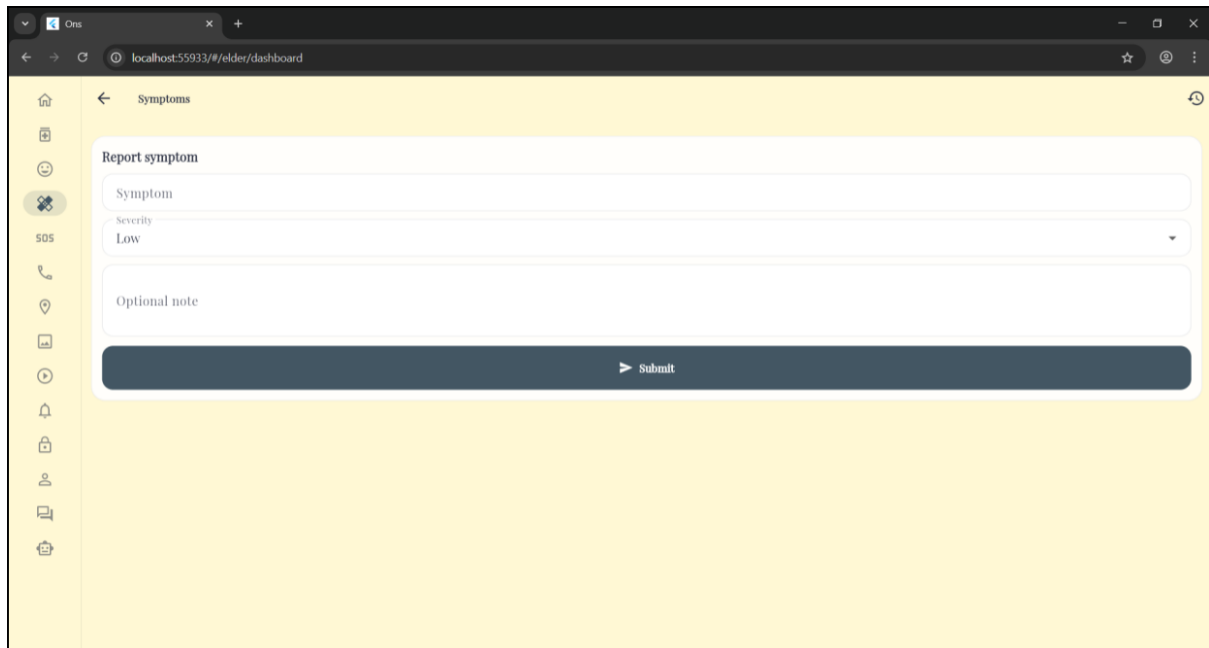


Figure 4.66: Symptoms reporting screen

Emergency (Panic Button)

Safety is our top priority. The app includes a very large, bright red emergency button that is hard to miss. When pressed, the system instantly alerts the family, caregiver, and administrator. This ensures a rapid response during a crisis, giving both the senior and their family peace of mind.

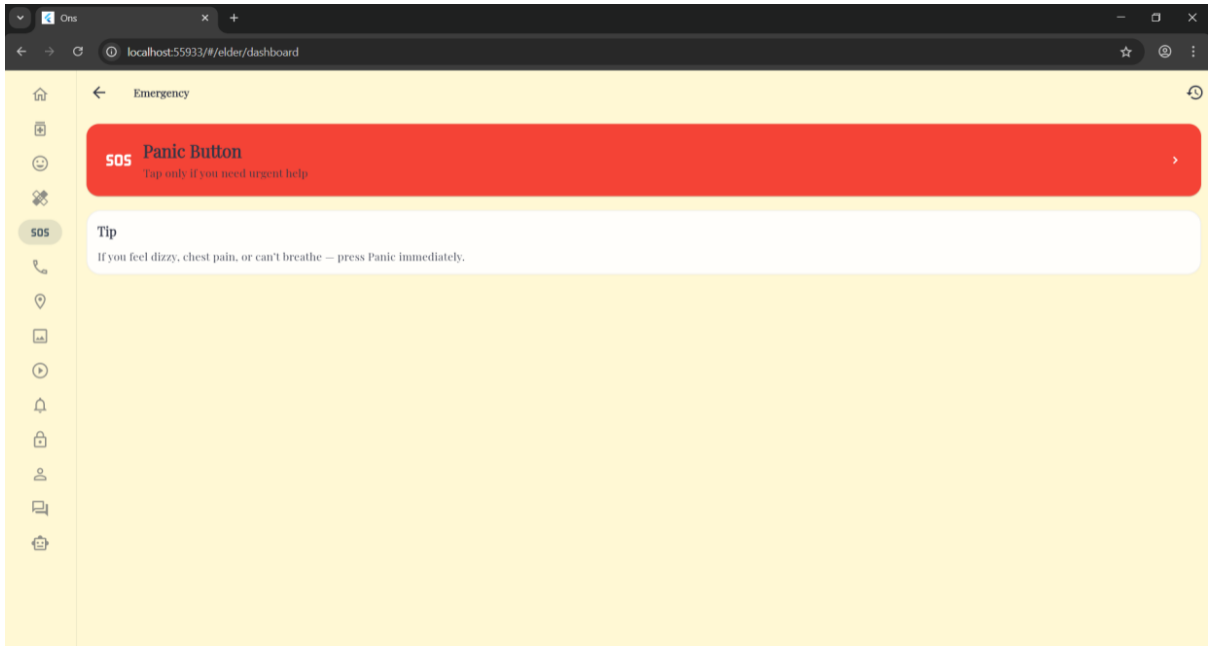


Figure 4.67: Emergency screen

Calls (Request and History)

Instead of navigating complex phone menus, seniors can use the Calls feature to request a phone call from a family member or caregiver. They can also see a history of their requests to check if they are "pending" or have been "accepted," which helps them feel more connected and heard.

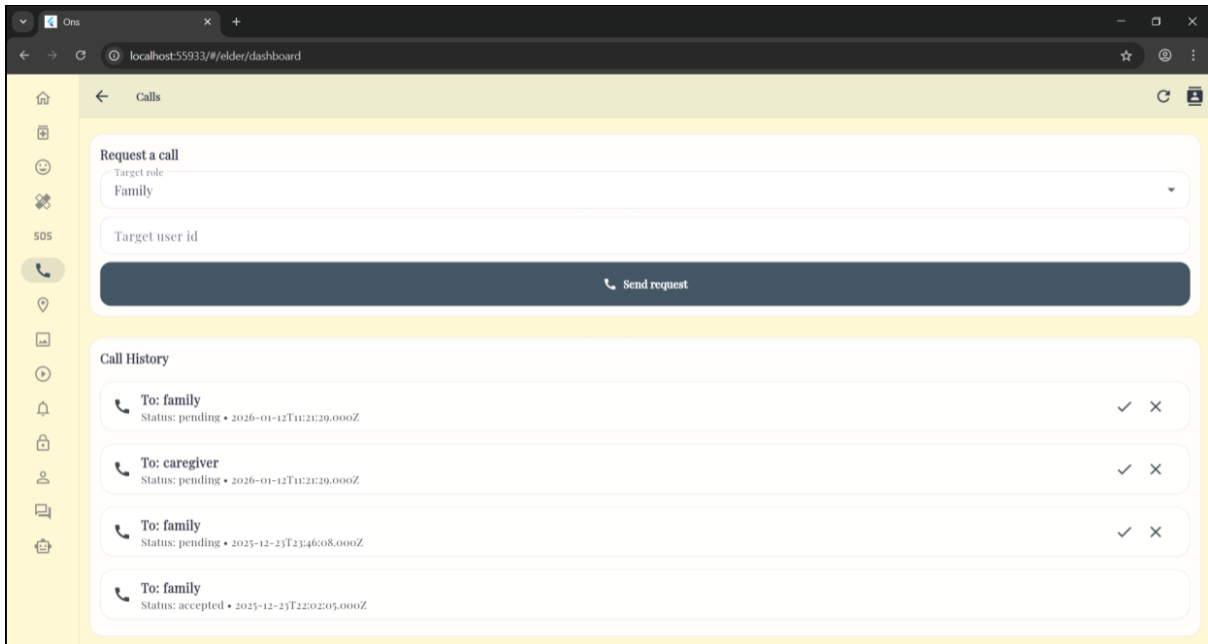


Figure 4.68: Calls screen

Location (Where Am I?)

For seniors who might feel disoriented when they are out, the Location screen shows their current coordinates. Most importantly, it includes a "Help, I'm lost" button. If they feel confused, they can trigger this action to send their exact location to their caregivers immediately.

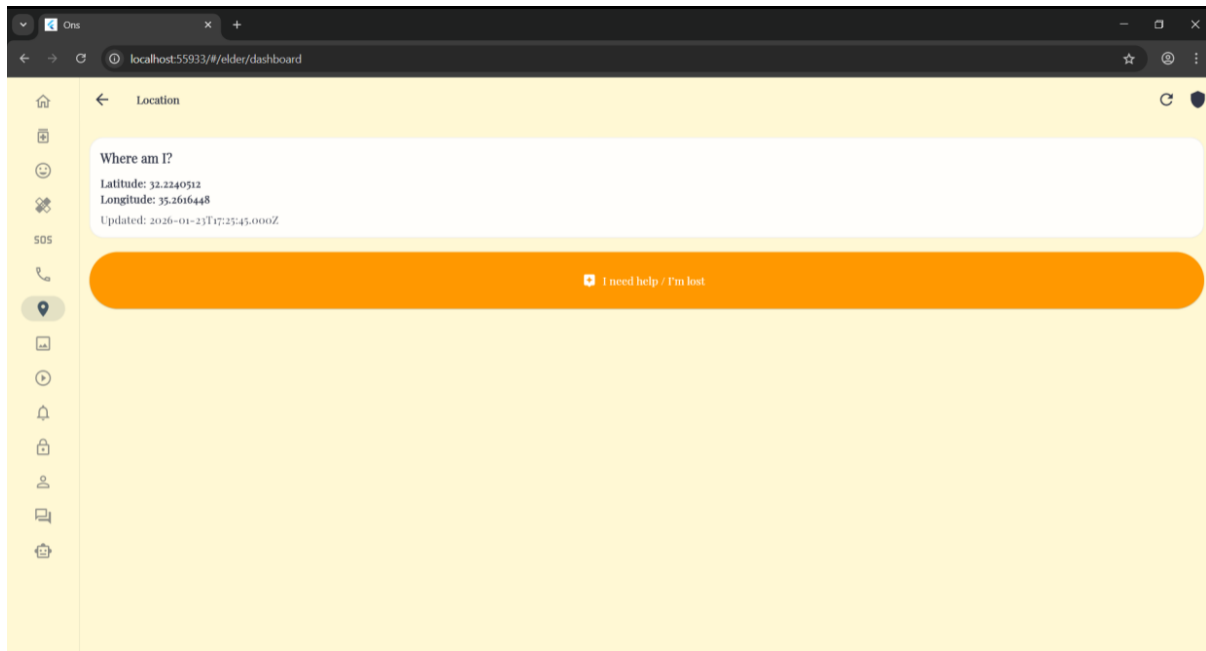


Figure 4.69: Location screen

Entertainment (Content Feed and Favorites)

To keep the mind active, ONS includes an Entertainment section. Here, seniors can browse articles, listen to podcasts, or play simple games. We made it easy for them to save their favorite content so they can return to it later without having to search for it again.

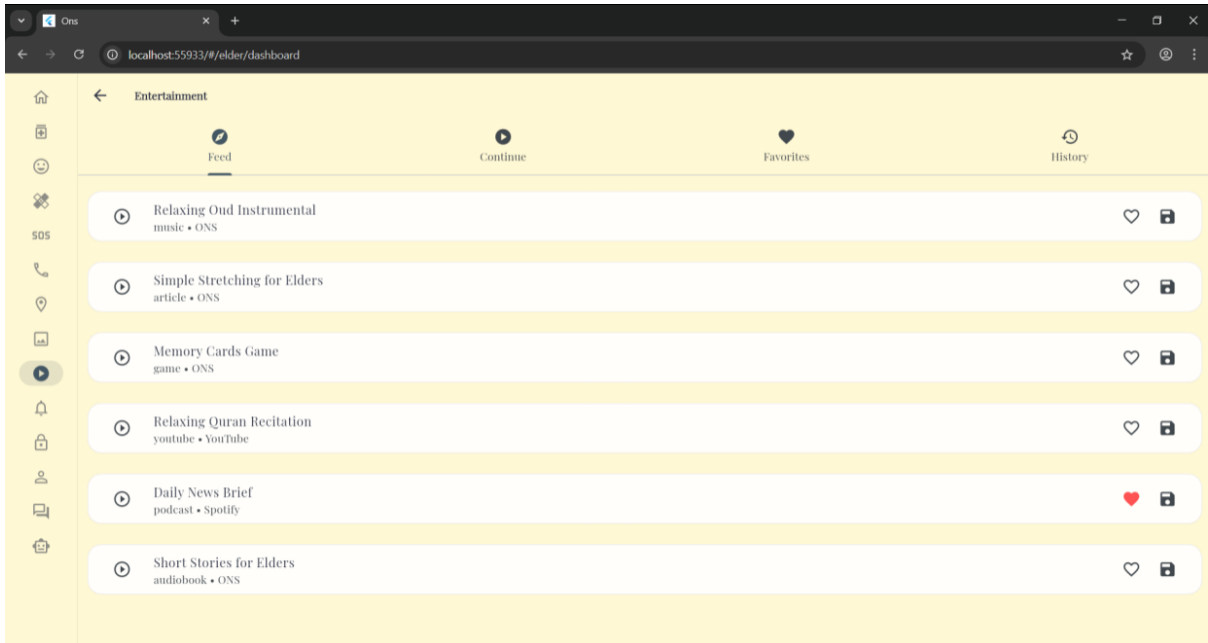


Figure 4.70: Entertainment feed with content categories

Privacy and Consent Control

We believe that seniors should stay in control of their own data. The Privacy screen allows them to choose exactly what they want to share. For example, they can turn on or off the sharing of their location or health logs with a simple switch. This protects their dignity while still providing the necessary safety monitoring.

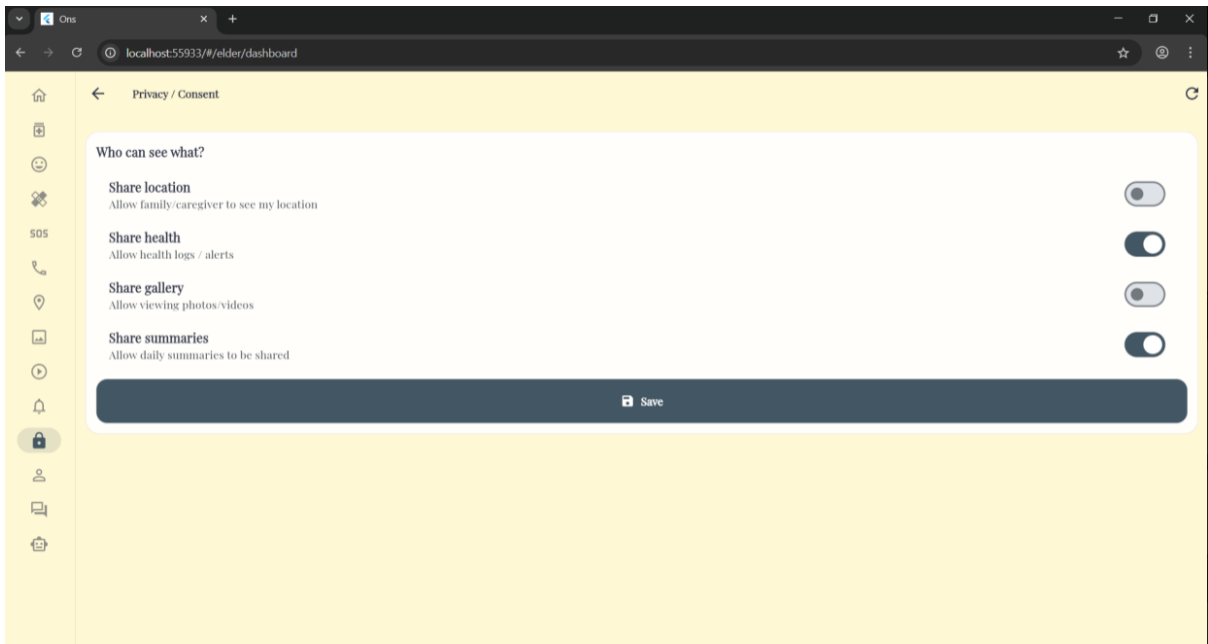


Figure 4.71: Privacy/Consent settings

Profile and Accessibility Settings

Since every senior has different needs, we included several accessibility options. Users can use a slider to make the text larger or switch to a "voice-first" mode. These settings ensure that the app remains easy to use even for those with poor eyesight or difficulty using a touchscreen.

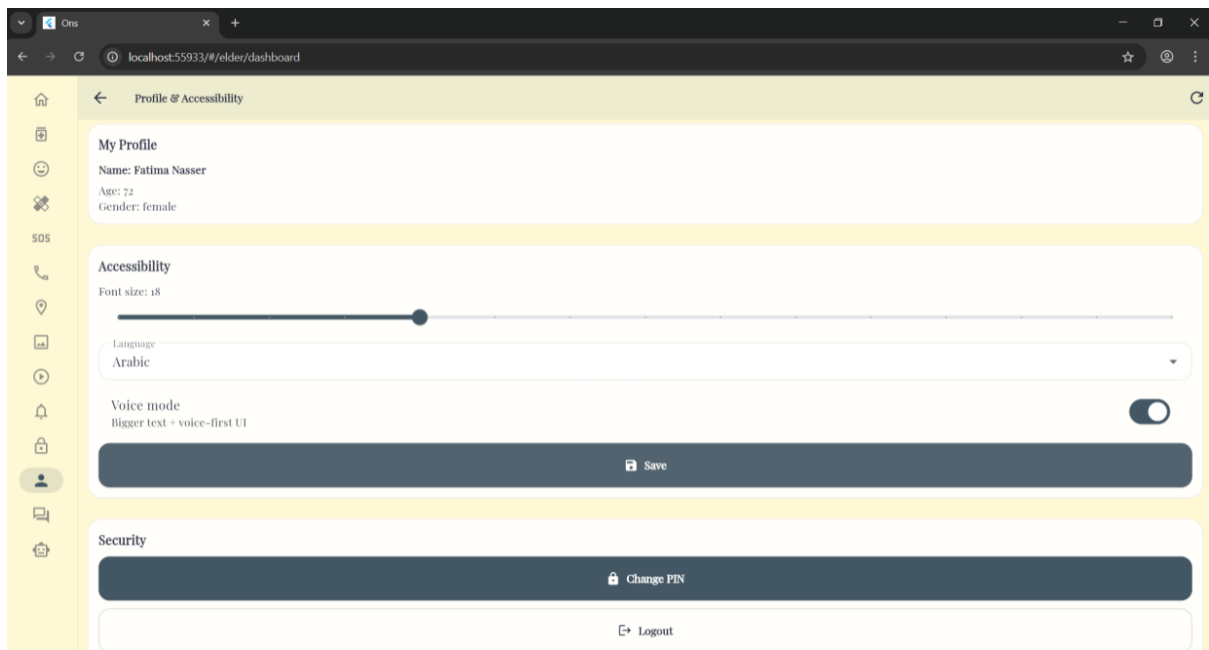


Figure 4.72: Profile and accessibility settings

Community and Social Interaction

To fight loneliness, the Community feature provides a safe, moderated space for seniors to talk to each other. They can share their thoughts, post updates, or browse topics that interest them. We kept the design very simple to encourage participation without making the user feel overwhelmed by social media "noise."

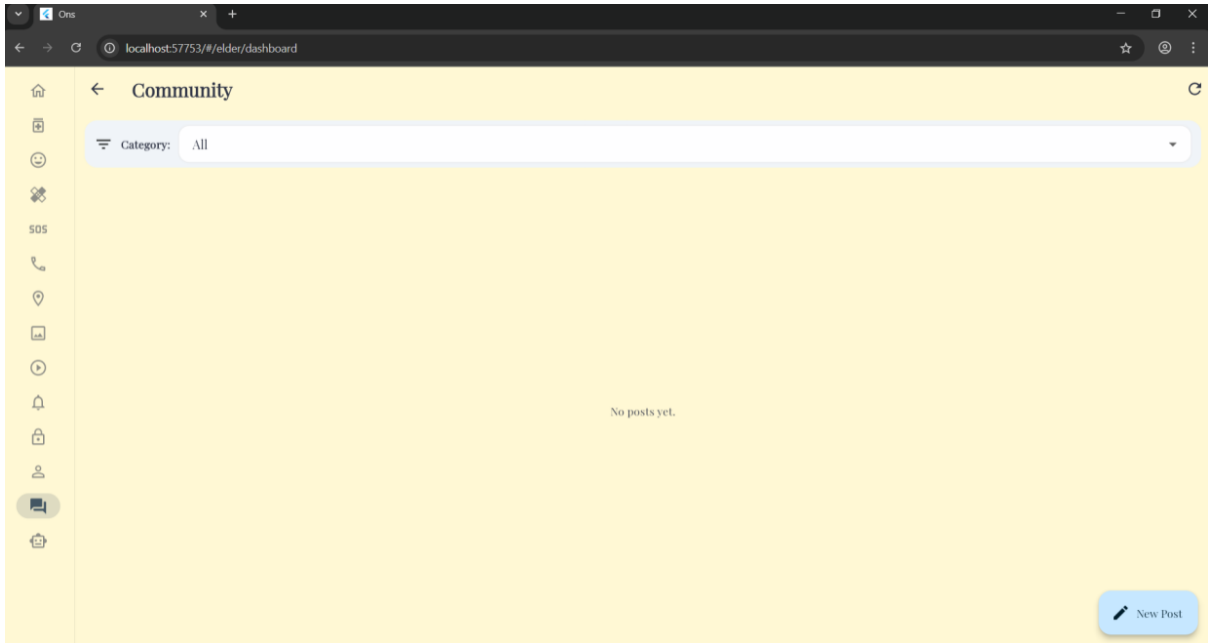


Figure 4.73: Community overview

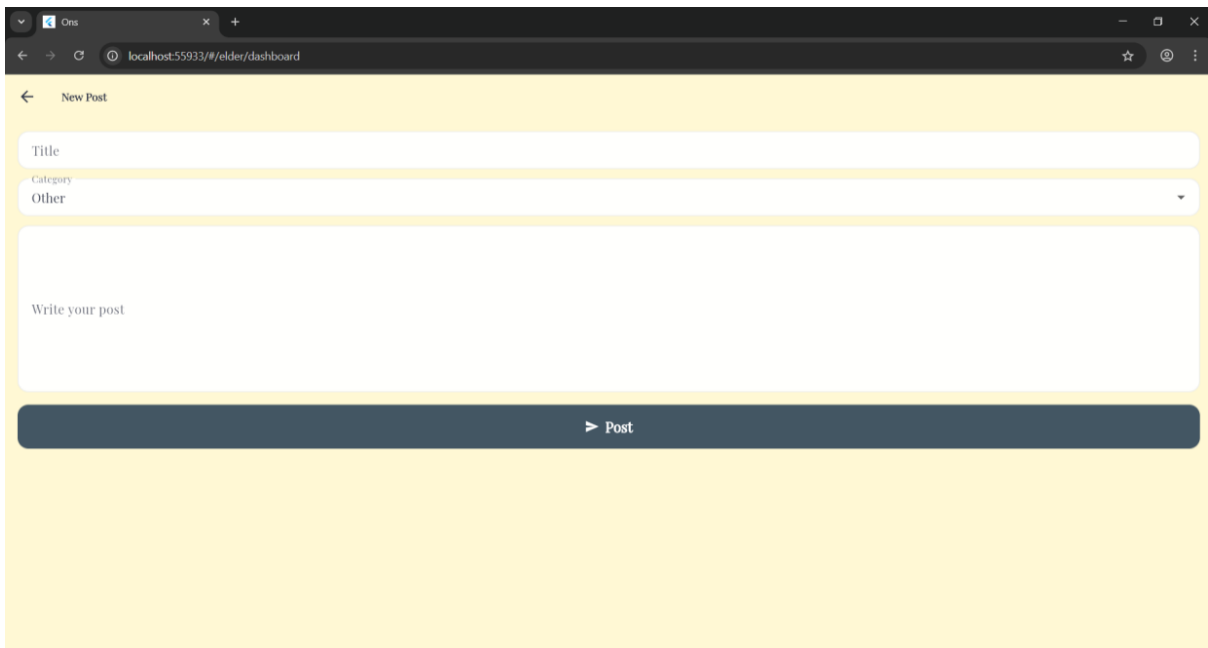


Figure 4.74: Community post creation screen

Gallery

The Gallery is a personal space for memories. Seniors can view photos of their family and friends in a large, clear format. Because of the privacy settings, the elder can control who is allowed to upload or see these images, making it a safe emotional space for the whole family.

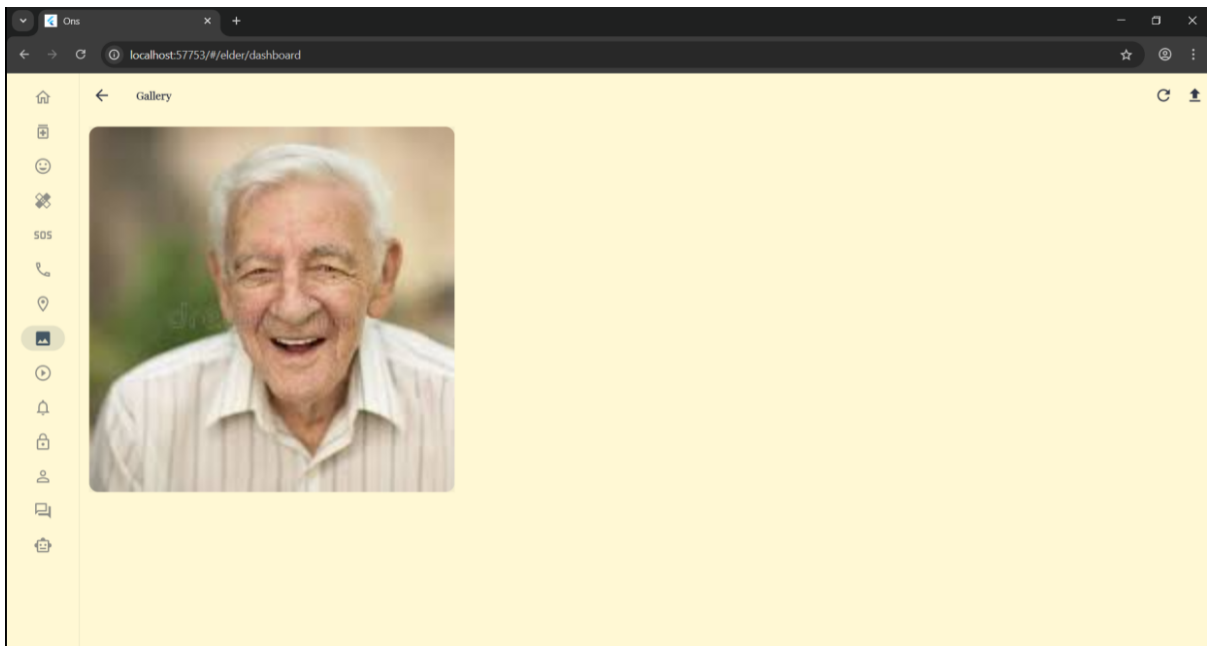


Figure 4.75: Gallery screen

AI Companion

The AI Companion is a friendly "digital friend" that provides emotional support. It can have natural conversations, ask how the elder is feeling, and give gentle reminders. This is especially helpful for those who live alone, as it provides a sense of companionship and encourages them to stay positive.

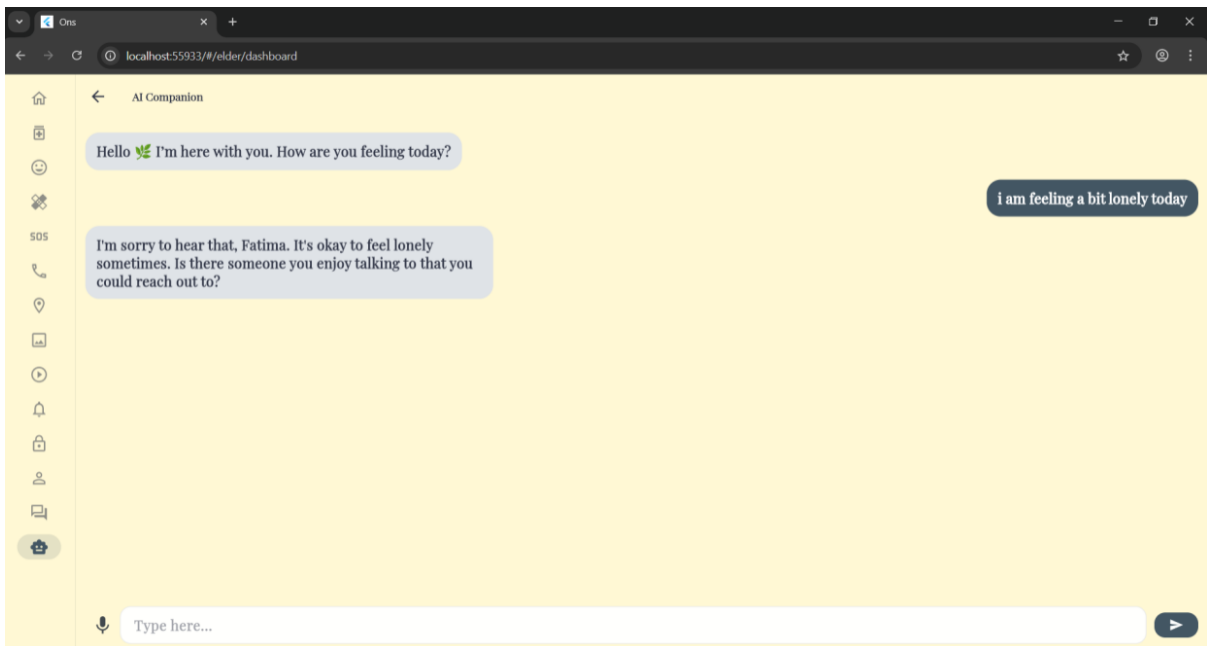


Figure 4.76: AI Companion chat interface

Here is the rewrite for the Retirement Home Module. I've simplified the technical

phrasing into a natural, B2-level flow that focuses on how this module helps managers run a facility smoothly.

4.2.5 Retirement Home Module

The Retirement Home module is built specifically for care facilities. It provides a central system to manage residents, staff, and daily schedules. This module helps administrators oversee everything happening in the home, ensuring that safety standards are high and that operations run efficiently.

Dashboard Overview

Once logged in, the administrator sees a dashboard that summarizes the entire facility's status. Using clear visual cards, it shows key numbers like the total number of residents, staff on duty, and any active alerts. This allows managers to quickly check if everything is okay and step in if a problem arises. It also includes basic settings, such as the facility's name and monthly fees, making it easy to manage institutional details in one place.

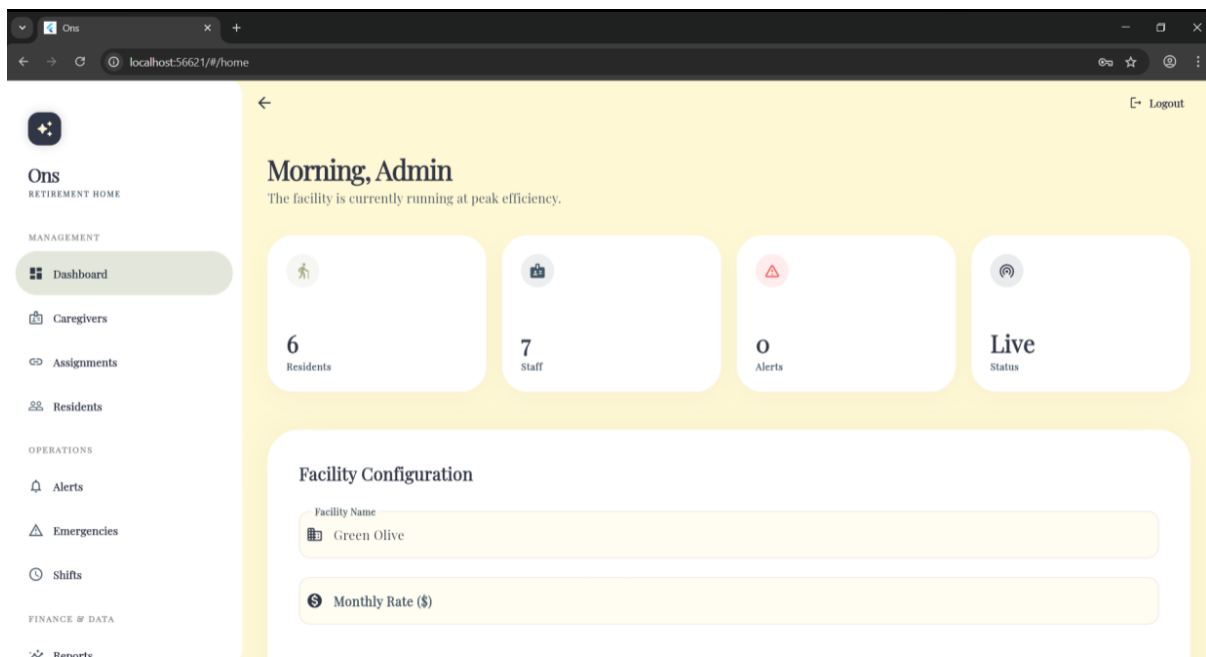


Figure 4.77: Retirement home dashboard

Caregiver Management

This section helps administrators keep track of their staff. Caregivers are organized by their status: those who are currently busy with a resident and those who are available for new tasks. This makes it much easier to balance the workload and ensures that every resident gets enough attention. It is also very helpful when new residents arrive, as managers can instantly see who is free to help.

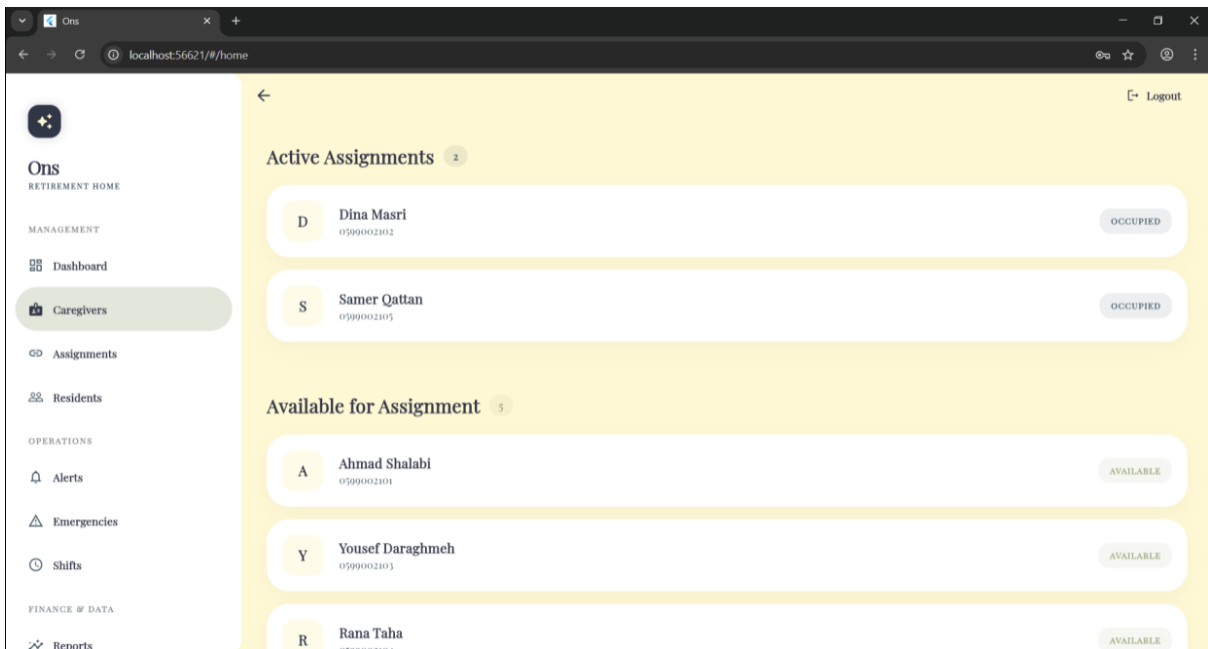


Figure 4.78: Caregiver management screen

Resident–Caregiver Assignment System

To ensure personal care, we built a pairing system that links residents with specific caregivers. With just a few clicks, an administrator can assign a staff member to a resident. The system maintains a clear list of these pairings, which creates accountability and ensures that the senior sees a familiar face for their daily care.

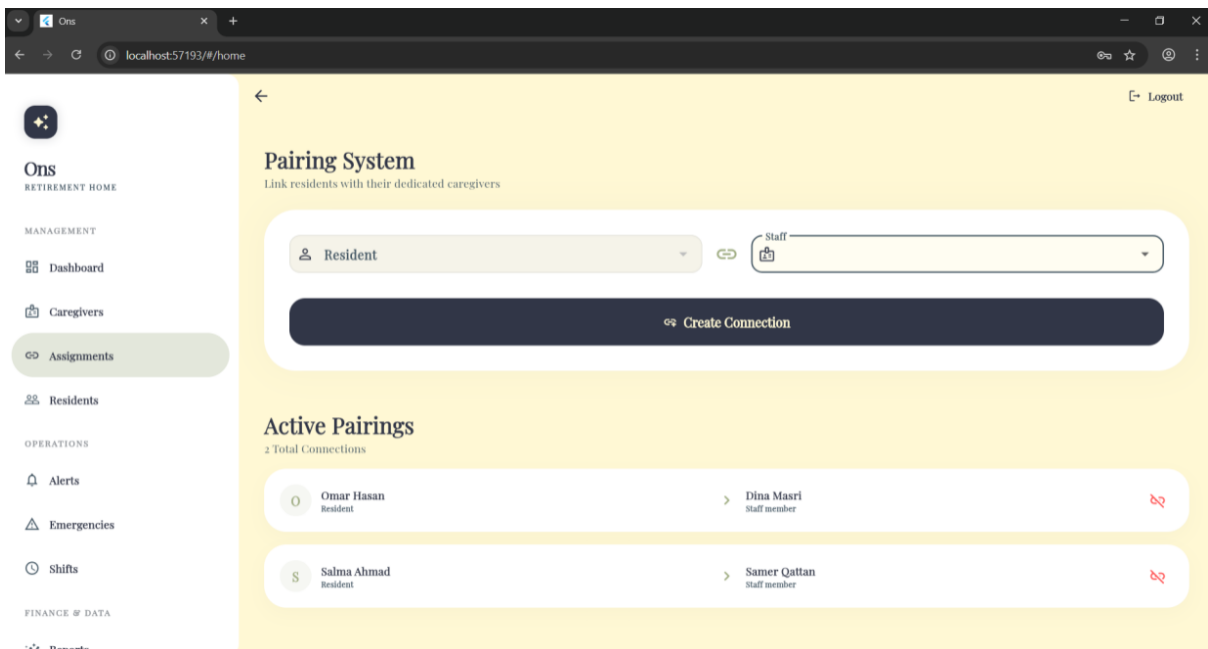


Figure 4.79: Resident–caregiver pairing system

Resident Monitoring

The Monitoring section gives a real-time view of everyone living in the home. Managers can see who is currently being looked after and by whom. Most importantly, it highlights if any resident is currently without an assigned caregiver. This prevents anyone from being overlooked and allows the staff to be proactive rather than just waiting for a problem to happen.

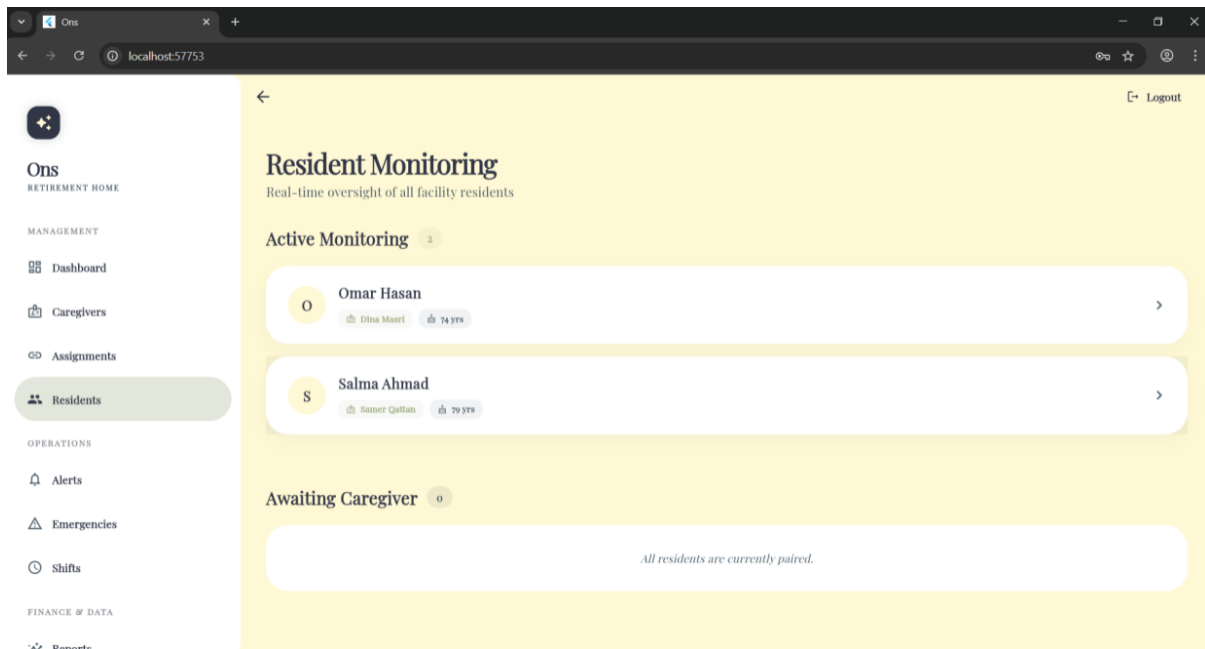


Figure 4.80: Resident monitoring screen

Staff Attendance and Shift Management

This feature helps manage working hours and staff availability. Administrators can "start" or "stop" a shift for any caregiver, ensuring that work hours are tracked accurately. By seeing exactly who is on duty at any moment, managers can quickly fill staffing gaps and make sure there is always enough help available throughout the day and night.

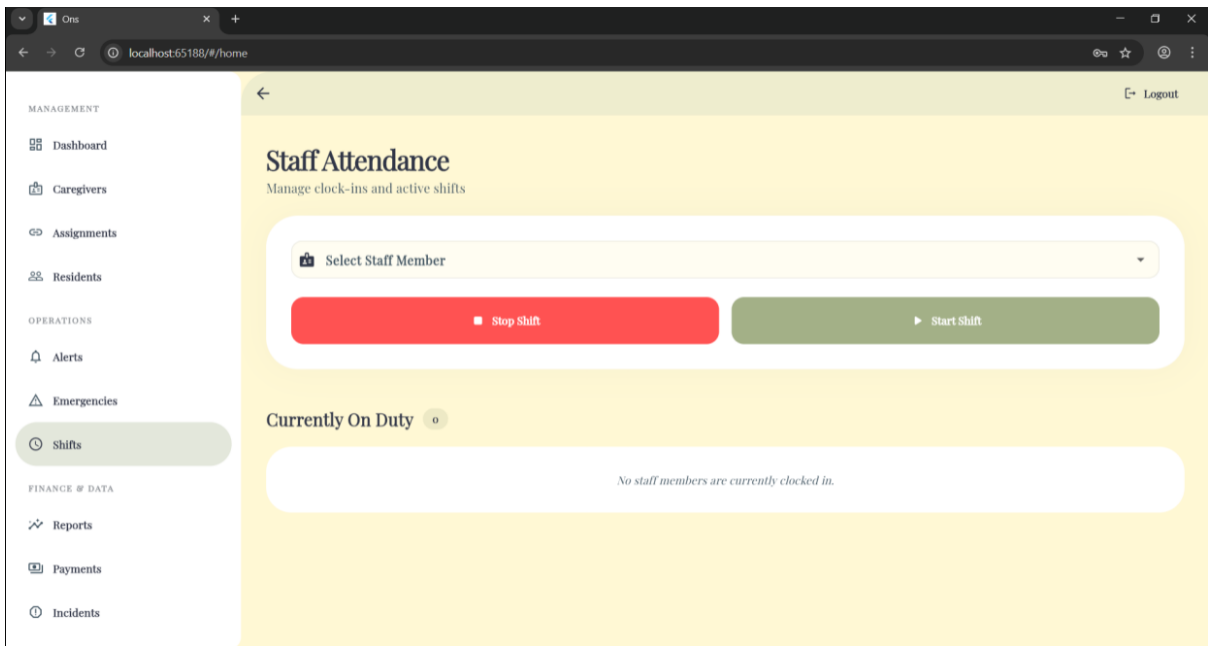


Figure 4.81: Staff attendance and shift management screen

System Alerts

The alerts module provides instant notifications about safety and health. These could be medical warnings, like a high heart rate, or behavioral issues, such as a missed check-in. Each alert shows the resident's name and how urgent the situation is. This helps administrators prioritize the most serious issues and act immediately to keep everyone safe.

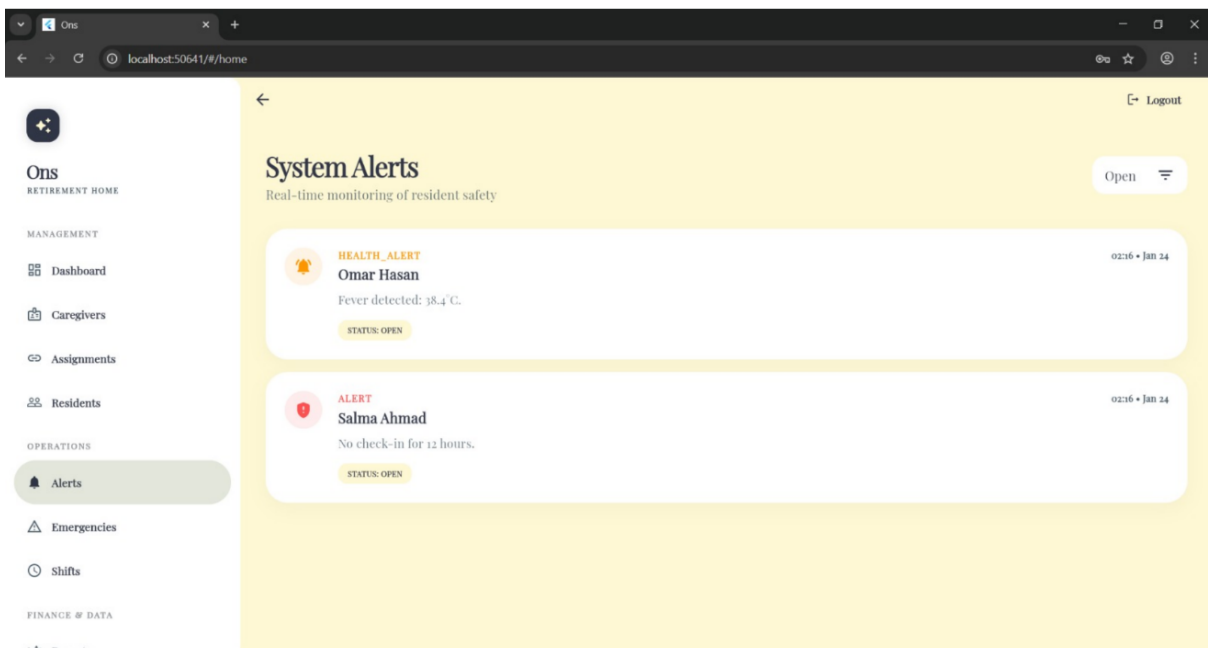


Figure 4.82: System alerts screen

Emergency Dispatch Center

The Dispatch Center handles urgent SOS calls from residents. If a resident presses their panic button, the manager instantly sees their identity, GPS location, and how far away they are. From this screen, the administrator can dispatch help or mark the request as "handled." This centralized response system ensures that help arrives as fast as possible during a crisis.

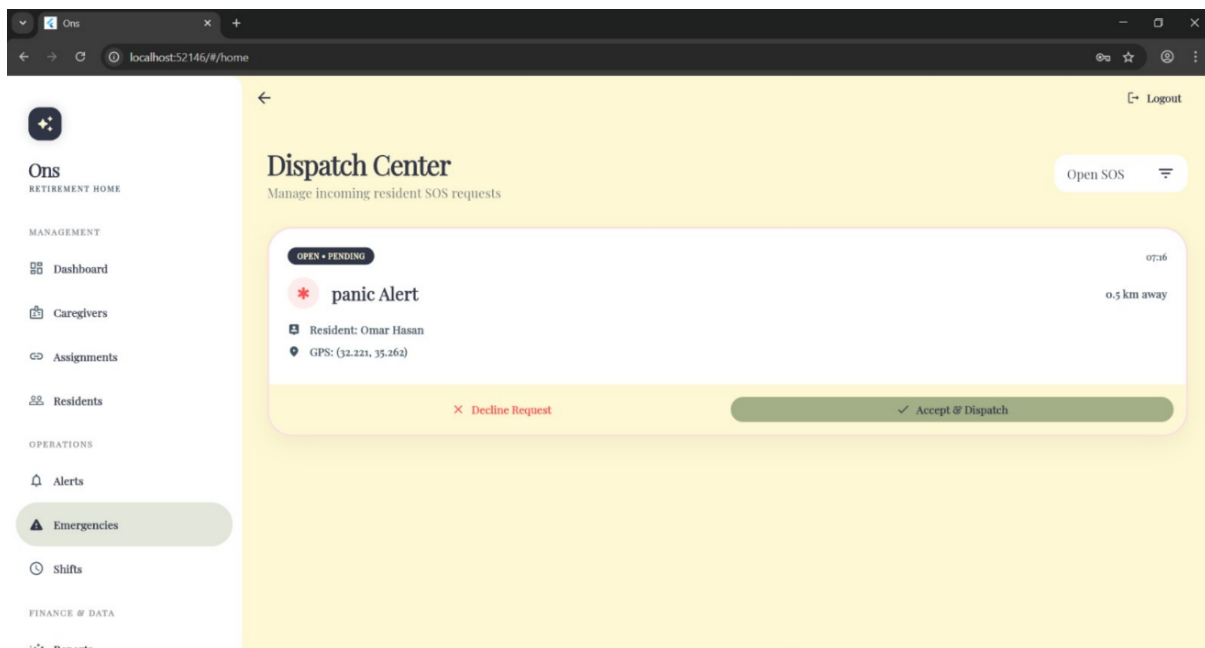


Figure 4.83: Emergency dispatch center

Financial Management

To keep the business running smoothly, the Financials module tracks revenue from subscriptions and family payments. It shows a clear record of who has paid and who has an outstanding balance. This transparency helps the facility manage its costs and ensures that all billing is handled professionally.

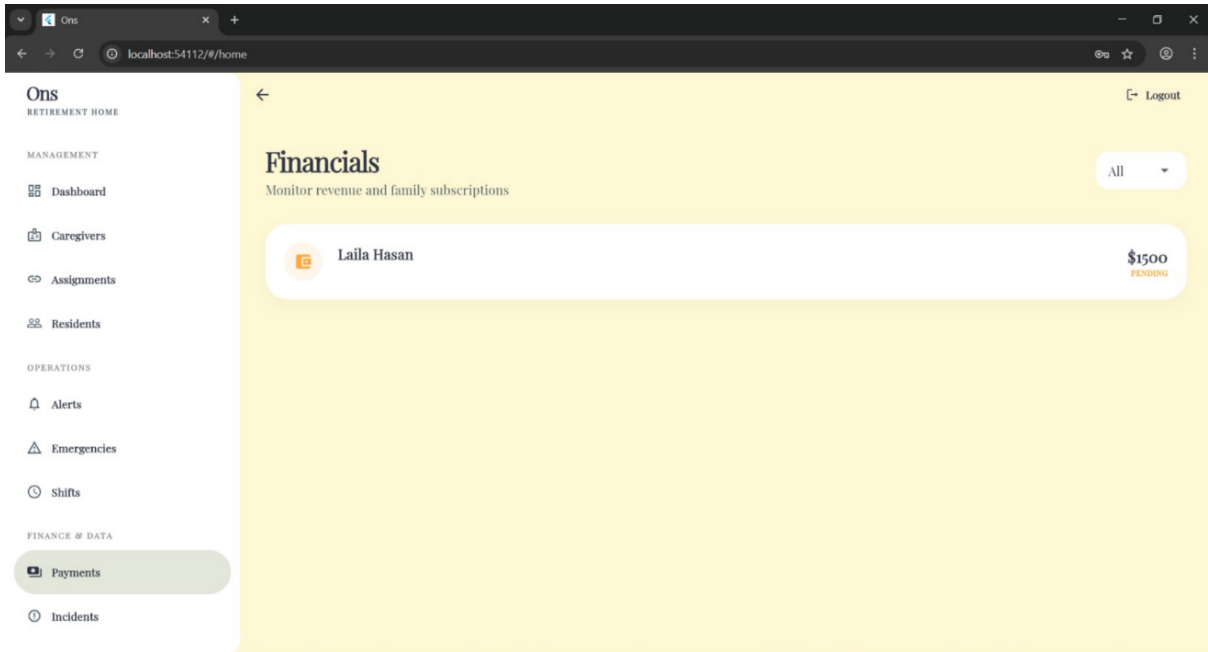


Figure 4.84: Financial management screen

Incident Reporting and Tracking

This module is used to document any accidents, such as falls. Each record tracks the type of incident and the status of the investigation (whether it is still "open" or "resolved"). Keeping these logs helps the facility improve its safety rules and provides a reliable history of events for future reviews.

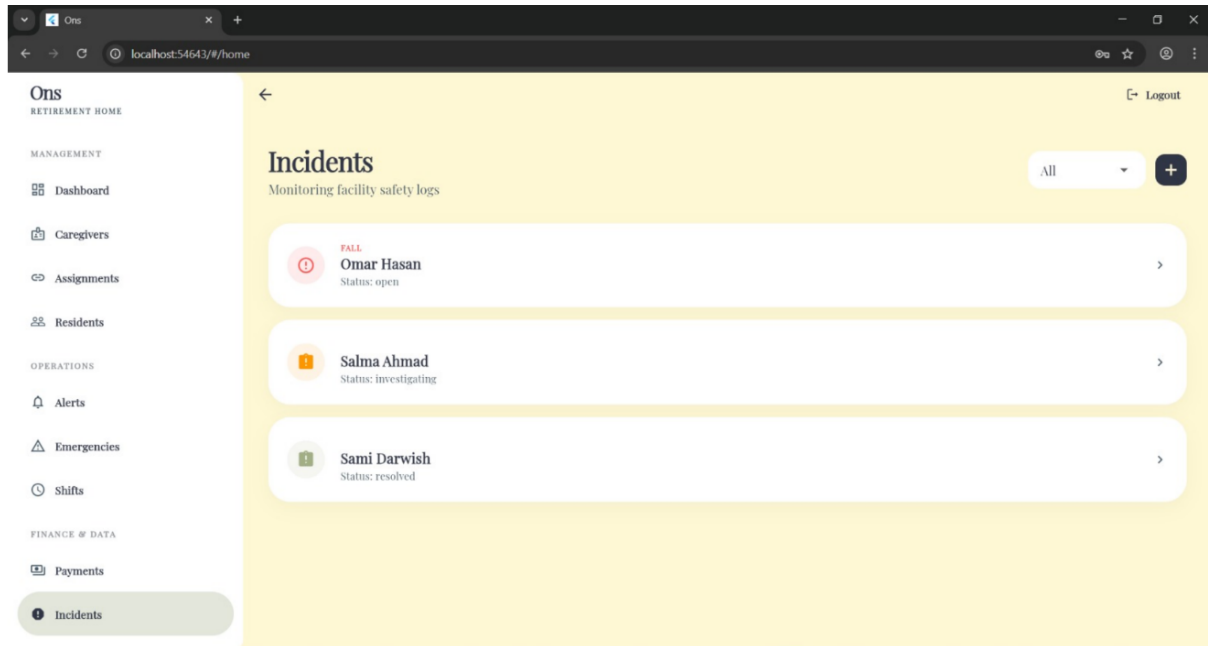


Figure 4.85: Incident tracking screen

Chapter 5

Conclusion

5.1 Summary

The ONS platform is an all-in-one health system designed to modernize elderly care. By bringing elders, families, caregivers, and retirement home staff together in one digital space, the platform makes it much easier to monitor health and coordinate daily support.

ONS handles the most important parts of healthcare, such as tracking vital signs, managing medications, responding to emergencies, and using GPS for safety. However, it also looks at the bigger picture by including an AI companion and a community area to help seniors stay socially active. While families get peace of mind by being able to check on their loved ones at any time, professional caregivers can stay organized by managing their tasks and shifts more efficiently.

By using modern tools like cloud services and AI, ONS shows that technology can do more than just track data—it can make care more personal and reliable. The project has successfully met its goals, creating a secure and easy-to-use platform that cares for both the physical and emotional needs of the elderly.

5.2 Limitations

While the ONS platform offers a complete solution for managing elderly care, there are a few limitations to keep in mind. First, connecting the system to wearable devices in real-time was somewhat limited by the hardware we had available and the specific software restrictions of different devices.

Additionally, because of time and resource constraints, we were not able to perform large-scale deployment or extensive performance testing with thousands of users at once.

However, these limitations do not impact the main features of the system. Instead, they serve as a roadmap for where we can improve and expand the platform in future development stages.

5.3 Future Work

While the current version of ONS works well, there are several ways we plan to expand and improve the system in the future:

5.3.1 Localization and Accessibility

We want to add support for more languages. We also plan to improve the design for users with vision or hearing difficulties to ensure everyone can use the app easily.

5.3.2 Wearable Integration

We aim to connect the system to more smartwatches and health sensors. This would provide even more accurate, real-time data and better alerts for caregivers.

5.3.3 AI and Predictive Health Analytics

In the future, we hope to use AI to find patterns in health data. This could help us predict potential health risks before they become emergencies, allowing for better preventive care.

5.3.4 Scalability

We plan to move ONS to a larger cloud infrastructure so it can support thousands of users across different regions without slowing down.

5.3.5 Telehealth Services

We want to improve the communication tools by adding high-quality video calls and messaging. This would allow seniors to have remote appointments with doctors or better face-to-face time with their families.

Chapter 6

References

Bibliography

- [1] **World Health Organization**, *Ageing and Health*, WHO, 2023. Available at: <https://www.who.int>
- [2] **Node.js Foundation**, *Node.js Documentation*, Available at: <https://nodejs.org>
- [3] **Google**, *Flutter Documentation*, Available at: <https://flutter.dev>
- [4] **Oracle**, *MySQL Reference Manual*, Available at: <https://dev.mysql.com/doc/>
- [5] **MongoDB Inc.**, *MongoDB Documentation*, Available at: <https://www.mongodb.com/docs/>
- [6] **OpenAI**, *OpenAI API Documentation*, Available at: <https://platform.openai.com/docs>
- [7] **MapQuest**, *MapQuest API Documentation*, Available at: <https://developer.mapquest.com>
- [8] **Twilio**, *Twilio Messaging and Email Services*, Available at: <https://www.twilio.com/docs>
- [9] **PayPal**, *PayPal Developer Documentation*, Available at: <https://developer.paypal.com>