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Sahara-Bot: An Elderly Healthcare Management System

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Abstract - *Many elderly people struggle to manage their daily health routines, remember medications, or seek help during emergencies, especially when living alone. Sahara-Bot solves these issues by acting as a voice-enabled personal assistant. It uses Optical Character Recognition (OCR) to identify medicines, send timely reminders, schedule appointments, and send instant alerts. The system is simple, interactive, and cost-effective, helping seniors remain independent and safe. Sahara-Bot shows how specialised digital systems can make elderly care easier and more reliable by combining voice technology, an AI chatbot, a reminder, and automation, providing a sense of relief to the elders, their families and caretakers.*

Key Words: **Elderly care, voice assistant, OCR, AI, healthcare management, reminder system, emergency alert, assistive technology.**

1. INTRODUCTION

The rising shift in the ageing population is posing several challenges in healthcare management. According to the World Health Organisation (WHO), the population aged 60 years and older is expected to go from 12% to 22% that is nearly double between 2015 and 2050. This ageing population faces numerous difficulties in their daily lives, such as maintaining health, independence and safety, especially when living alone or with limited support. This population faces some challenges, such as managing multiple medications, remembering complex health routines and prescriptions and seeking immediate help when in an emergency.

Many existing applications and systems fail to meet the specific needs of older adults despite the vast development in digital healthcare technologies. Traditional health management systems revolve around visual interfaces, complex navigation menus, and manual data entry, which may not be very suitable for middle-aged or aged individuals with age-related impairments, such as weak vision, hearing loss, cognitive decline or physical limitations. Additionally, existing general virtual assistants, although capable of performing basic voice commands, somehow lack the contextual understanding required for elderly care.

Therefore, this problem needs a solution, which is an intelligent, user-friendly system made specifically for elderly users. Sahara-Bot integrates multiple technologies like Optical Character Recognition (OCR) for reading medication labels, speech recognition, real-time medication reminder and an emergency alert notification system by combining all these features in a single system.

1.1 PROJECT PURPOSE AND OBJECTIVES

The main purpose of Sahara-Bot is to design an intelligent system that integrates a voice assistant, medication reminder and prescription management and querying, as well as alert notification to the caretakers in one system. The system aims to simplify daily life tasks such as reading medication and prescriptions, remembering the dosage time and contacting or alerting the caretakers instantly whenever needed. Sahara-Bot reduces the need for manual input and visual interaction by combining OCR (Optical Character Recognition), automated reminders, and emergency alerts, making it more accessible for users with cognitive difficulties, physical impairments or limited technical skills.

OBJECTIVES

1. Voice Interaction Feature: Talking to someone or a system using our voice is what this feature is all about. Just like Alexa, we have integrated a speech recognition and text-to-speech system that will allow the user to operate the app hands-free. The response time would also be quicker.

2. Scheduled medication notifications: Allows users to set up medication timers, which will send notifications to users at the exact time they took the medicine. This will work in the background as well.

3. Caregiver dashboard: Get live health reports, care logs and emergency notifications from elderly users.

4. Emergency Notification: Emergency notification will allow our elderly users to immediately send their name, location and predicament to any pre-registered caregiver using Twilio.

1.2 LITERATURE REVIEW

The growing elderly population has led to increased research in assistive technologies that promote independent living and healthcare management. Over the past decade, several digital health systems have been developed to address age-related challenges, including memory loss, medication management, and mobility limitations. However, most of these systems focus on medical monitoring rather

than on user-centred accessibility, leaving a gap in technology designed specifically for elderly users. Early studies on assistive technologies emphasised sensor-based systems for remote health monitoring. For example, wearable devices and smart home sensors were used to collect health parameters such as heart rate, movement, and sleep patterns. While effective in data collection, these solutions often require technical setup and maintenance, which can be overwhelming for older users (Rodríguez et al., 2022). Additionally, the cost of such systems limits their accessibility in low and middle-income regions.

Several studies have also explored the use of Optical Character Recognition (OCR) in healthcare. OCR enables automatic reading of printed text, such as medical prescriptions or labels, which is particularly useful for elderly users with poor eyesight. For example, Google's ML Kit and Tesseract OCR have been applied in various healthcare applications to extract and digitise medical information accurately. Despite this, few systems integrate OCR directly into a voice-controlled ecosystem designed for seniors.

From this review, it is clear that while individual technologies like voice assistants, OCR, and reminder systems have been well-studied, there remains a lack of integration among them within a single, easy-to-use platform. The Sahara-Bot project addresses this gap by combining these technologies into a single mobile application focused on simplicity, affordability, and accessibility. It creates an interactive companion that assists elderly individuals in managing their health proactively and independently.

2. METHODOLOGY

The proposed system architecture is a Health platform integrating a **Streamlit** frontend, a **Flask** RESTful API, and a **MongoDB** NoSQL database. The design reduces cognitive load for elderly users by replacing complex manual navigation with a voice-first interface. The system features an AI-driven data ingestion pipeline where Tesseract OCR extracts raw text from user-uploaded prescription images. To mitigate optical noise, the Google Gemini LLM acts as a semantic reasoning engine, parsing this unstructured text and mapping critical medical entities into predictable JSON key-value pairs for seamless NoSQL database integration. To ensure high reliability, an asynchronous reminder engine utilises APScheduler to run independent background cron-jobs that trigger the Twilio SMS API, delivering medication alerts directly to the user's mobile device regardless of active app usage. Emergency intervention is facilitated through a single-action SOS trigger that compiles the user's identity and real-time location for instant dispatch via Twilio SMS to assigned caregivers. Furthermore, the framework maintains stateless security by implementing Flask-JWT-Extended to generate and validate JSON Web Tokens for every API request, ensuring sensitive health records remain protected and safe.

2.1 Technologies Used

- Mobile Framework: Streamlit and Flask
- Voice Assistant: text-speech[gTTS] & Vosk[offline]
- Task Scheduling: APScheduler.
- OCR Engine: Tesseract OCR.
- Backend & Auth: JSON web token (JWT system) & MongoDB NoSQL database with custom Flask API.
- Emergency Alerts: Twilio SMS API.

2.2 Data Flow

ELDERLY USER (Streamlit Frontend):

-Uploads prescription image
-Tesseract OCR extracts raw text
- Google Gemini structures text into JSON
-MongoEngine stores to MongoDB
-APScheduler monitors scheduled times
-Twilio SMS sends a reminder to the user

EMERGENCY FLOW:

-User triggers SOS on Streamlit
-Flask API compiles alert payload
-Twilio SMS dispatches to the caregiver
-Caregiver responds
-status updated in MongoDB

ADMIN / CAREGIVER (Streamlit Dashboard):

-View health reports and activity logs
-Flask API fetches from MongoDB
-JWT token validates every request
-Dashboard updates in real time

2.3 Testing & Validation

- Functional Testing: All modules (OCR pipeline, JWT auth, APScheduler, Twilio alerts) verified individually
- Usability Testing: Conducted with users aged 55–70 years
- Performance Testing: OCR accuracy, API response latency, SMS delivery timing

- ***Results:***

o 85% plus users felt more confident and independent

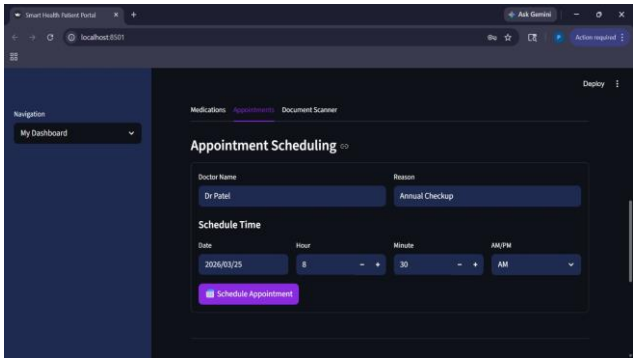
o OCR and Gemini pipeline produced clean, structured medication data reliably

o SMS reminders delivered accurately via Twilio cron triggers.

o Emergency alerts dispatched successfully with user identification data

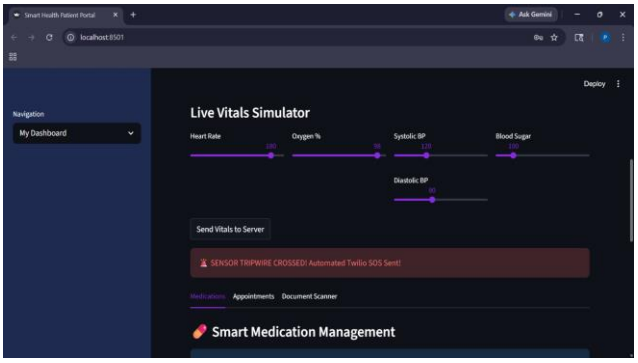
1. Appointment Scheduling

Users can schedule an appointment with their doctors and also be notified about it in the system as well as through SMS alert.



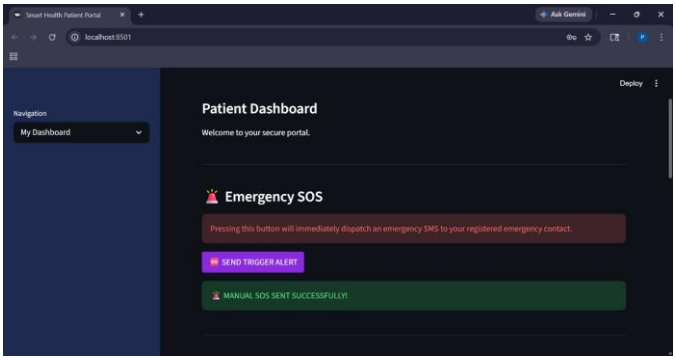
2. Live Vitals Simulator

Live vitals of the patients/users can be checked on the system, and get SMS alerts if they are not normal for the respective patient/user.



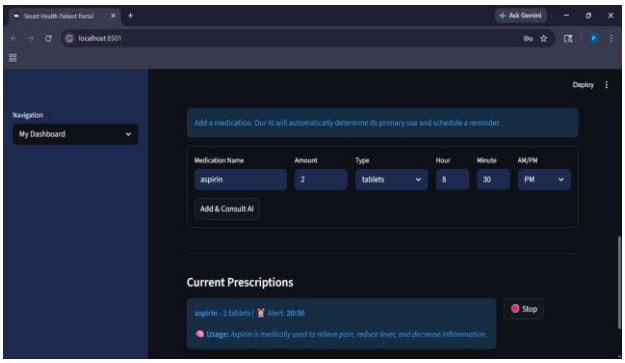
3. Patient Dashboard

The patient dashboard consists of sending an SOS message, a voice assistant, and medication reminders, which remind them about their medication time. The voice assistant helps them to chat with the VA in their free time or ask any queries to the assistant. The SOS message, whenever triggered, sends an alert to the caregiver's device through SMS.



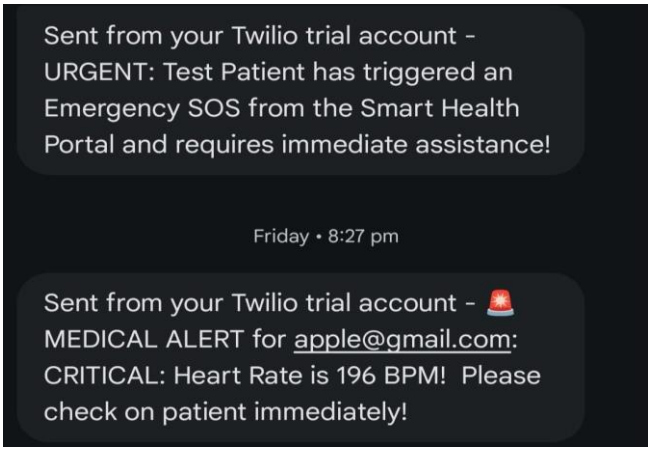
4. Prescription consultation and reminders.

Medication consultation and reminder, where users can ask the chatbot about any particular medicine prescribed and its usage and optimal doses. It also sets the medication reminders to both the caregivers' and the patient's devices.



5. Alert sent on mobile phone.

All emergency alerts or messages are sent via SMS to the caregiver's device, which was implemented using Twilio.



3. CONCLUSIONS

The Sahara-Bot system, therefore, allows users to access and perform various needed actions in one place, thereby overcoming the challenge of non-integrated healthcare systems and ease of use, primarily for older adults who face difficulties in their daily routines because of medical and health reasons, cognitive difficulties and other such reasons. The Sahara-Bot allows them to schedule an appointment with doctors, live vitals checking, and get to know about the prescription details and medicine uses through a chatbot, as well as sending SMS alerts to their respective caregivers who have been registered in the system. Sahara-bot allows us to privilege all these tasks in one system instead of approaching different applications or systems for different needs.

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REFERENCES

[1] World Health Organisation, Ageing and Health, World Health Organisation, Geneva, 2021. [Online]. Available:https://www.who.int/newsroom/factsheets/detail/ageing- and-health

[2] M. D. Rodríguez, S. A. Martínez, and P. González, "Voice Interaction Systems for Elderly Users: Design Challenges and Opportunities," IEEE Access, vol. 10, pp. 120435–120449, 2022.

[3] K. Gupta and A. Sharma, "Assistive AI for Elderly Healthcare: Challenges, Design, and Implementation," IEEE Transactions on Human-Machine Systems, vol. 53, no. 1, pp. 14–25, Jan. 2023.

[4] S. Patel, H. Park and L. Bonato, "A Review of Wearable Sensors and Systems with Application in Rehabilitation," Journal of Neuro Engineering and Rehabilitation, vol. 9, no. 21, pp. 1-17, 2022.

[5] A. Singh and R. Kumar, "Design and Implementation of a Voice-Enabled Health Monitoring System for Elderly People," International Journal of Advanced Computer Science and Applications (IJACSA), vol. 14, no. 4, pp. 112–118, 2023.

[6] S. H. Suryadevara and S. C. Mukhopadhyay, "Wireless Sensor Network Based Home Monitoring System for Wellness Determination of Elderly," IEEE Sensors Journal, vol. 12, no. 6, pp. 1965–1972, 2022.

[7] C. R. Wadhwa and J. S. Singh, "Healthcare Monitoring System Using IoT and Machine Learning," in Proc. IEEE International Conference on Computing, Communication, and Automation (ICCCA), 2022, pp. 132–138.

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