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Carevia: An Android-Based Smart Patient Care and Nurse Booking Management System

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Abstract **- Access to home healthcare services requires effective coordination between patients and nursing professionals. This paper presents Carevia, an Android-based Smart Patient Care and Nurse Booking Management System designed to organize patient–nurse interactions and support home healthcare booking. The application frontend provides the foundation for patient and nurse interfaces, while the proposed system workflow covers nurse profile viewing, booking request submission, availability management, and request handling.**

Additional planned enhancements include location-based nurse discovery, multi-criteria nurse recommendation, and optical character recognition (OCR) for extracting text from prescription images. Currently, frontend development has been completed, whereas backend integration and database connectivity remain incomplete. Consequently, the present prototype demonstrates the interface design and intended workflows rather than a fully operational booking system. Future work will focus on backend implementation, database integration, functional and integration testing, usability evaluation, and validation of the proposed enhancements.

Index Terms **- Android application, home healthcare, nurse booking, mobile healthcare, appointment management, healthcare coordination.**

I. INTRODUCTION

Mobile applications and cloud-based technologies are increasingly being adopted to improve the accessibility, coordination, and management of healthcare services. Home healthcare is particularly important for patients who require nursing assistance, elderly care, post-operative support, or other forms of care outside traditional healthcare facilities. In such situations, patients and their family members need a convenient way to identify suitable nursing professionals, review their profiles, communicate their requirements, and arrange appointments according to their preferred dates and times.

However, arranging home nursing services through phone calls, text messages, and manual records can be time-consuming and difficult to manage. Such methods may lack a centralized mechanism for maintaining nurse profiles, recording booking details, tracking appointment status, and managing availability. As the number of patients and service requests increases, manual coordination may lead to communication gaps, scheduling conflicts, duplicate records, and delays in confirming appointments. Therefore, a structured digital system is needed to organize home healthcare booking and improve coordination between patients and nursing professionals.

Existing research has examined healthcare appointment scheduling, including appointment allocation, resource availability, and operational efficiency [1]. Studies on home healthcare scheduling and nurse routing have also addressed the coordination of patient requests, nursing staff availability, and home visits [2], [3]. Mobile appointment applications provide additional context for using digital interfaces to organize healthcare appointments [4], while research on nurse scheduling addresses the allocation and management of nursing resources [5]. However, these systems may differ in their objectives, target users, and workflows. Conventional doctor appointment systems generally focus on consultations with medical practitioners, whereas nurse scheduling systems may emphasize staff allocation and institutional duties. These differences motivate further exploration of mobile systems designed specifically to

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organize patient–nurse interactions for home healthcare.

This paper presents Carevia, an Android-based Smart Patient Care and Nurse Booking Management System intended to organize patient–nurse interactions and booking-related activities. The current development stage focuses on the frontend interface, while backend integration and database connectivity remain incomplete. Accordingly, the paper describes the current prototype and the proposed system design without claiming that the complete booking workflow has been implemented and validated.

The main contributions of this paper are as follows:

1. **Role-based mobile interface**: The Carevia frontend presents separate patient and nurse interfaces to organize role-specific interactions within an Android application.

2. **Proposed nurse-booking workflow**: The system design defines a workflow for specifying service requirements, submitting booking requests, reviewing requests, and recording booking decisions.

3. **Nurse profile and availability management**: The proposed system is designed to organize nurse profile information and availability so that patients can identify potentially suitable professionals.

4. **Centralized booking information design**: The proposed architecture includes a data-management component for organizing user profiles and booking records after backend and database integration.

5. **Testing and evaluation framework:** A future evaluation plan is defined to assess functional correctness, booking-status consistency, usability, and workflow response time once the required components have been implemented

Section II reviews related work on healthcare appointment systems, home healthcare scheduling, and mobile health applications. Section III presents the proposed Carevia system and its architecture. Section IV describes the development methodology and testing plan. Section V discusses the proposed nurse recommendation framework and risk analysis. Section VI presents the current development status, preliminary observations, and limitations. Finally, Section VII concludes the paper and outlines future work.

II. RELATED WORK

Research on healthcare scheduling has examined how appointments can be planned while balancing access, capacity, uncertainty, and service quality. Ahmadi-Javid, Jalali, and Klassen reviewed optimization studies on outpatient appointment systems and organized the literature around strategic, tactical, and operational decisions [1]. Their review provides a basis for understanding booking as more than a calendar operation: scheduling policies, resource availability, and operating conditions affect service quality.

A. Healthcare Appointment Systems

Previous studies have explored digital appointment systems to help patients book appointments and manage schedules [2], [3], [5]. These systems simplify healthcare booking, but they mainly focus on doctor consultations rather than home nursing services.

B. Home Healthcare Scheduling

Demirbilek et al. studied methods for scheduling home healthcare visits in response to patient requests and nurse availability [2]. Their work provides relevant background for the scheduling and coordination challenges addressed by Carevia.

C. Home Nurse Booking Applications

The CareSync study, published in 2026, describes a mobile application that connects families with home-care nurses and supports elderly-care monitoring [1]. This study is closely related to Carevia because both applications aim to support home nursing services through mobile technology Similarly, Carevia focuses on connecting patients and nurses through an Android application.

D. Research Gap

Existing healthcare applications mainly focus on doctor appointments, nurse scheduling, or general healthcare services. Carevia focuses on connecting patients with nurses for home healthcare through an Android application. It provides separate functionalities for

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patients and nurses to manage profiles, submit booking requests, and respond to requests. The application will be evaluated through functional and usability testing to assess its correctness and ease of use.

III. PROPOSED SYSTEM AND ARCHITECTURE

A. System Overview

Carevia is an Android-based Smart Patient Care and Nurse Booking Management System developed to simplify the process of connecting patients with nurses for home healthcare services. The system provides a common platform where patients can view nurse profiles, submit booking requests, and receive responses from nurses. It also enables nurses to manage their profiles, maintain their availability, and accept or reject booking requests.

The main objective of Carevia is to make the home nursing booking process simple, organized, and convenient. Instead of relying entirely on phone calls or manual communication, patients and nurses can use the application to manage booking-related activities. The system separates patient and nurse functionalities to support their different requirements.

B. System Workflow

The proposed Carevia workflow is designed to organize interactions between patients and nursing professionals. In the intended workflow, users access the application through role-specific interfaces, patients review nurse profiles and provide booking requirements, and nurses review requests according to their availability. The design also includes booking-decision and status-tracking steps. However, backend integration and database connectivity remain incomplete; therefore, the complete request-processing workflow and persistent status updates have not yet been validated in an end-to-end implementation.

The main steps of the workflow are as follows:

1. **User Registration and Login:** Patients and nurses register and log in to access the application.
2. **Profile Management:** Nurses maintain their profiles and availability, while patients view nurse information.
3. **Booking Request:** Patients select a suitable nurse and submit the required booking details.
4. **Request Review:** The selected nurse reviews the booking request.
5. **Booking Decision:** The nurse accepts or rejects the request.
6. **Status Update:** The system updates the booking status for the relevant users.
7. **Record Management:** Booking information is maintained for future reference, according to the application's implemented functionality.

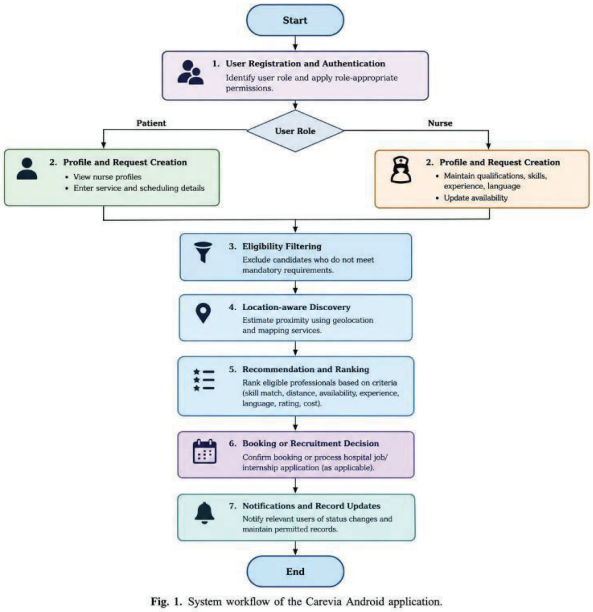


Fig. 1. System workflow of the Carevia Android application.

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B. Multi-Role Modules

Carevia is designed to support role-specific functions for patients and nursing professionals, with hospital and administrator modules considered as proposed extensions. The functions described in this section represent the intended system design; their availability depends on implementation and testing. The current development stage has completed the frontend, while backend services and database connectivity remain incomplete.

A. Patient Module

Carevia is designed to support multiple user roles, including patients, nurses, hospitals, and administrators. Each module provides role-specific functions to support healthcare booking, professional coordination, and platform management. The availability of individual functions depends on the implemented version of the system**.**

B. Nurse and Healthcare Professional Module

The nurse module supports the management of professional information and patient booking requests. Nurses can maintain their profiles, update their availability, review incoming requests, and accept or reject bookings according to their schedules. The proposed professional profile may include qualifications, registration details, experience, skills, language preferences, location, and hospital affiliation. Additional capabilities may include internship information, job applications, and temporary-shift management.

C. Hospital Module

The hospital module is intended to support institutional management and healthcare workforce coordination. Its proposed functions include hospital registration, staff information.The module may also support authorized reports and operational analytics. Access to patient-related information should be limited to authorized personnel and restricted to the minimum information required for a legitimate purpose.

D. Administrator Module

The administrator module supports the overall management and security of the Carevia platform. Its proposed responsibilities include user and hospital account management, verification workflows, complaint handling, monitoring of transactions, and generation of operational reports. Administrative access should be restricted to authorized personnel. Important administrative activities, including account changes and verification decisions, should be recorded in audit logs to improve accountability and support security monitoring.

E. AI-Based Nurse Recommendation and Location Intelligence

The proposed recommendation component aims to identify suitable nurses according to the patient's service requirements. Potential ranking criteria include relevant skills, qualifications, professional experience, availability, language preferences, ratings, estimated cost, and geographical distance.

These functions require implementation and testing before their effectiveness can be claimed. The research evaluation should consider recommendation relevance, scheduling accuracy, location accuracy, and the handling of unavailable or unsuitable professionals.

F. OCR-Based Prescription Processing

The proposed prescription-processing module will use optical character recognition (OCR) to extract readable text from uploaded prescription images. The extracted information may include medicine names, dosage instructions, and treatment duration when these details are legible and supported by the selected OCR technology. The extracted text should be presented for review by the patient or an authorized healthcare professional. OCR output may contain errors due to handwriting, image quality, or prescription layout; therefore, extracted information must not be treated as a verified medical instruction without appropriate review. This feature remains a proposed enhancement and has not yet been validated in the current prototype.

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A. System Architecture

Carevia is designed as an Android-based platform for coordinating patients and nursing professionals. The proposed architecture includes a presentation layer for user interaction, an application layer for booking-related operations, and a data layer for managing user profiles, nurse availability, and booking records. Additional services may support location- based nurse discovery, notifications, AI-based recommendations, and OCR-based prescription processing.

At the current development stage, the frontend interface has been completed, whereas backend services and database connectivity remain incomplete. Therefore, the application and data layers represent the planned system design rather than a fully integrated implementation. Future development will focus on implementing these components and validating their interaction through functional and integration testing.

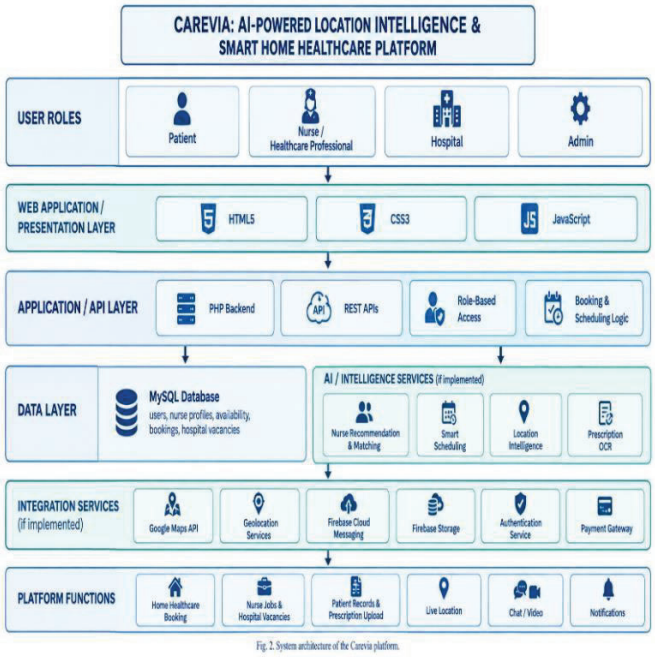


Fig. 2. System architecture of the Carevia platform

TABLE I
A. COMPARISON OF EXISTING APPROACHES

Existing System/Study	Main Focus	Relevance to Carevia
Appointment Systems [1]	Healthcare scheduling	pports appointment management
lome Healthcare Scheduling [2]	Nurse availability and visits	Supports nurse assignment
Nurse Routing [3]	Scheduling and travel	Supports location-based services
Mobile Nurse Scheduling [5]	Nurse shift management	pports availability management
'areSync [12]	Home-nurse booking	Related work for patient nurse coordination.
Proposed Carevia	atient–nurse booking	Focuses on organizing home-care booking interactions.

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D.*Preliminary Research Gap*

Previous studies have explored healthcare appointment scheduling, home-healthcare assignment, nurse scheduling, and digital home-care coordination [1] – [12]. Carevia aims to combine patient–nurse booking with location-aware professional discovery and hospital workforce management within a unified platform. Its contribution should be evaluated through functional testing, usability assessment, and comparison with existing systems. The proposed integration alone does not establish research novelty; this requires a detailed comparison with prior work.

IV. METHODOLOGY

A. Requirement Analysis

The first phase involves identifying the functional requirements of patients and nurses. The main objective is to provide a convenient digital platform for requesting and managing home nursing services. The patient module requires registration, login, nurse profile viewing, and booking request submission. Patients provide relevant booking information, including the required date, time, and reason for nursing assistance. The nurse module requires profile management, availability management, and the ability to accept or reject incoming requests.

B. System Design

The second phase focuses on designing the application structure and interaction between its modules. Carevia is organized into two primary user modules: the patient module and the nurse module. The patient module provides access to nurse profiles and booking functionality, whereas the nurse module provides facilities to manage availability and respond to requests. The application workflow defines the sequence of interactions between patients and nurses, from nurse selection to booking status updates. The system design separates the user interface from the planned booking operations and data management. The detailed backend architecture and database design will be finalized during future implementation.

C. Application Development

The frontend of the Carevia Android application has been developed to establish the user interface for patient and nurse interactions. The interface is intended to support nurse profile viewing and booking-related activities. Backend development and database connectivity remain incomplete; therefore, persistent storage, actual booking request processing, and synchronized booking status updates cannot yet be confirmed.

D . Testing and Evaluation Plan

Following backend integration, Carevia will undergo functional testing, integration testing, and usability evaluation. Functional testing will examine the individual application features, while integration testing will assess communication between the frontend, backend services, and database. Usability evaluation will assess task completion, navigation clarity, and user satisfaction. Measures such as task completion time, booking success rate, and user satisfaction will be collected where applicable. These evaluations remain future work, and no performance results are claimed at the current stage.

V. Proposed Nurse Recommendation And Risk Analysis

The current Carevia application focuses on patient–nurse coordination through nurse profile viewing and booking request management. To improve the process of identifying suitable nursing professionals, a multi-criteria nurse recommendation framework is proposed as a future enhancement. The framework aims to evaluate eligible nurse profiles according to patient requirements, nurse availability, relevant skills, distance, experience, language compatibility, ratings, and service cost.

A. Eligibility Filtering

Let (C) represent the set of registered nurse profiles and (r) represent a patient's service request. The eligible set is defined as

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$$[E(r)=\{n\in C|Q(n,r)\wedge K(n,r)\wedge A(n,r)\}]$$

where (Q), (K), and (A) represent qualification eligibility, required skill compatibility, and availability, respectively. Additional constraints, such as service-area coverage, may be included if supported by verified data.

or risk modeling, retain:

$$R_i = L_i \times I_i$$

where $L_i$is the likelihood and I_i is the impact of a risk, each rated from 1 to 5.

$$REi = Pi \times Ci$$

The nurse recommendation framework and risk assessment are proposed design methods and have not yet been validated through implementation or empirical testing. The eligibility criteria, scoring weights, and risk ratings will require verification during future development. Security controls and booking-conflict prevention mechanisms will also need to be implemented and tested before their effectiveness can be established.

B. Enhanced Risk Modeling

Risk modeling is used to identify and prioritize potential risks in the Carevia system, including unauthorized access, personal data exposure, incorrect booking details, conflicting appointments, and nurse unavailability. Each risk is assessed based on its likelihood and impact.

The risk priority score is calculated as:

[R_i=L_i\times I_i]

where (R_i) is the risk score, (L_i) is the likelihood, and (I_i) is the impact, each rated on a scale of 1 to 5.

Risk exposure can also be estimated using:

[

E_i=P_i\times C_i]

where (P_i) is the probability of a risk occurring and (C_i) is its potential operational or financial impact.

VI. PRELIMINARY RESULTS AND LIMITATIONS

The current Carevia prototype has completed the frontend development of an Android-based patient care and nurse booking application. The developed interface is intended to organize patient and nurse interactions through dedicated screens for the functions included in the current prototype. However, backend development and database integration remain incomplete.

Therefore, the current prototype demonstrates the interface design and intended user interactions rather than a fully operational end-to-end booking system. The frontend alone cannot establish successful backend authentication, persistent data storage, booking synchronization, or reliable status updates. The proposed nurse recommendation framework and OCR-based prescription processing have not yet been validated experimentally.

No quantitative performance results are reported because systematic functional, integration, and usability evaluations remain future work. After backend integration, the system should be tested using a defined protocol and suitable measures, including task completion time, booking success rate, and user satisfaction where applicable.

A. Limitations

The primary limitation of the current prototype is the incomplete backend implementation. Future work will focus on integrating authentication, database operations, nurse availability management, booking request processing, and booking status updates. Once these components are integrated, functional testing, integration testing, and usability evaluation can be conducted

Further enhancements may include multi-criteria nurse recommendations, location-aware nurse discovery, and improved booking-

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conflict prevention. Their effectiveness will need to be assessed using appropriate test cases and measurable results. Future work will focus on implementing the proposed nurse recommendation framework and evaluating its performance using suitable test data. Quantitative measures, such as booking success rate, task completion time, and user satisfaction, should be collected to determine the practical effectiveness of Carevia.

Overall, the completed frontend establishes the initial user-interface foundation of Carevia. Backend integration and systematic evaluation are necessary to validate the functionality, reliability, and practical usefulness of the proposed system.

VII. CONCLUSION AND FUTURE WORK

Carevia is an Android-based Smart Patient Care and Nurse Booking Management System intended to improve coordination between patients and nursing professionals for home healthcare services. The current development stage has completed the frontend interface, establishing the initial structure for patient–nurse interactions and booking-related workflows.

However, backend integration and database connectivity remain incomplete. Consequently, the current prototype does not yet demonstrate a fully functional end-to-end booking process. The proposed nurse recommendation framework, location-aware discovery, OCR-based prescription processing, and risk-assessment approach require implementation and validation before their effectiveness can be established.

Future work will focus on implementing backend services, integrating a database, enabling booking-request processing and status updates, and conducting functional, integration, and usability testing. Subsequent evaluation will use defined test cases and measurable outcomes to assess the system's reliability and practical usefulness. Carevia therefore provides an initial frontend foundation for a home healthcare coordination application, with further implementation and empirical evaluation required.

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