HEALTHPAL: A HEALTH MANAGEMENT APP FOR SENIORS AND CHILDREN

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Abstract

Dengan perkembangan pesat penyelesaian penjagaan kesihatan digital, terdapat peningkatan permintaan untuk aplikasi pengurusan kesihatan yang mesra pengguna dan cekap khusus untuk warga emas dan kanak-kanak. Banyak aplikasi sedia ada gagal menangani cabaran unik yang dihadapi oleh kumpulan ini, seperti isu kebolehaksesan, kekurangan sokongan penjaga dan antara muka yang tidak menarik. Projek ini memperkenalkan HealthPal, aplikasi pengurusan kesihatan berpusat yang direka untuk memudahkan penjejakan kesihatan dan memberikan cadangan yang diperibadikan. HealthPal memastikan pemantauan kesihatan berkualiti tinggi dengan menggabungkan cerapan dipacu AI, pemberitahuan penjaga masa nyata dan elemen interaktif kanak-kanak untuk menggalakkan tabiat yang lebih sihat. Selain itu, HealthPal menyokong diet, senaman, dan menyediakan pendekatan holistik kepada kesihatan. HealthPal dibangunkan menggunakan React Native dengan keupayaan merentas platform, Node.js untuk operasi backend dan colab untuk pengurusan pangkalan data yang cekap. TensorFlow digunakan untuk menyediakan pengesyoran diperibadikan berasaskan AI. Proses pembangunan disokong oleh Android Studio untuk pengekodan aplikasi, Navicat untuk pengendalian pangkalan data dan Kod Visual Studio untuk pengeditan lain. HealthPal menyasarkan warga emas, kanak-kanak dan penjaga yang mencari penyelesaian pengurusan kesihatan komprehensif yang intuitif dan berkesan. Dengan HealthPal, pengguna boleh mengurus kesihatan mereka sambil menikmati persekitaran yang tersusun, interaktif dan boleh dipercayai untuk meningkatkan kesejahteraan keseluruhan mereka.

Kata kunci : HealthPal , Pengurusan kesihatan digital, AI – driven.

Abstract

With the rapid development of digital healthcare solutions, there is an increasing demand for user-friendly and efficient health management applications specifically for seniors and children. Many existing applications fail to address the unique challenges faced by these groups, such as accessibility issues, lack of caregiver support, and unattractive interfaces. This project introduces HealthPal, a centralized health management application designed to simplify health tracking and provide personalized recommendations. HealthPal ensures high-quality health

monitoring by incorporating AI-driven insights, real-time caregiver notifications, and child interactive elements to promote healthier habits. In addition, HealthPal supports diet, exercise, and provides a holistic approach to health. HealthPal is developed using React Native with cross-platform capabilities, Node.js for backend operations, and colab for efficient database management. TensorFlow is used to provide AI-based personalized recommendations. The development process is supported by Android Studio for application coding, Navicat for database handling, and Visual Studio Code for other editing. HealthPal targets seniors, children, and caregivers who are looking for an intuitive and effective comprehensive health management solution. With HealthPal, users can manage their health while enjoying a structured, interactive, and reliable environment to improve their overall wellness.

Keywords： HealthPal, Digital health management, AI - driven.

1.0 INTRODUCTION

Health management is becoming increasingly important, especially for vulnerable populations such as the elderly and children. As societies age and attention to children 'health increases, ensuring these populations maintain a balanced lifestyle is a major challenge. Effective health management includes multiple aspects, including monitoring diet, exercise, sleep, and mental health - all of which have a significant impact on quality of life.

However, both the elderly and children face unique difficulties in managing their health independently. Elderly people may have difficulty using complex health management tools due to a lack of digital literacy or cognitive challenges, while children often require engaging and motivating experiences to follow health guidelines. In recent years, mobile health applications have become increasingly popular as effective health management tools. These applications allow users to actively participate in monitoring their health data, obtain personalized health insights, and communicate with caregivers and family members, creating a health-centric support network.

HealthPal is a comprehensive, centralized platform designed to help seniors and children manage their health by combining user-friendly and motivating features tailored to their specific needs. The goal is to provide a digital solution that fills the gap in health management for these groups, simplifies their experience, and improves health outcomes.

2.0 LITERATURE REVIE

Existing health management applications have significant limitations when it comes to serving the elderly and children. The popular fitness app MyFitnessPal excels in diet and exercise tracking, yet it lacks the simplicity suitable for the elderly and the gamified elements to engage children, so it is less effective for these two groups (Smith & Brown, 2020). SeniorCare,

designed specifically for the elderly, focuses on medication reminders and caregiver monitoring but neglects key elements such as diet and sleep tracking, greatly reducing its comprehensiveness.

HealthMonster, targeted at children, integrates interactive features for exercise and diet but fails to meet the broader needs of caregivers or the elderly. As Smith and Brown (2020) believe, effective health management requires a holistic approach that integrates multiple health dimensions, and existing applications often lack this. A comparison of these tools reveals deficiencies in centralized tracking, age - appropriate design, and caregiver integration.

HealthPal addresses these deficiencies by combining diet, exercise, and sleep monitoring with personalized artificial intelligence recommendations. It adopts an intuitive interface for the elderly and incorporates gamified elements for children, while also supporting the real - time supervision of caregivers. This design complies with the guidelines of the World Health Organization (2021) that emphasize accessible and comprehensive health technologies, ensuring that it meets the unique needs of both user groups."

Table 1 System comparison

Application	Diet Management	Sleep Tracking	Caregiver Support	Simplicity for Seniors
MyFitnessPal	✓	✕	✕	✕
SeniorCare	✕	✕	✓	✓
HealthMonster	✕	✕		✕
HealthPal	✓	✓	✓	✓

3.0 METHODOLOGY

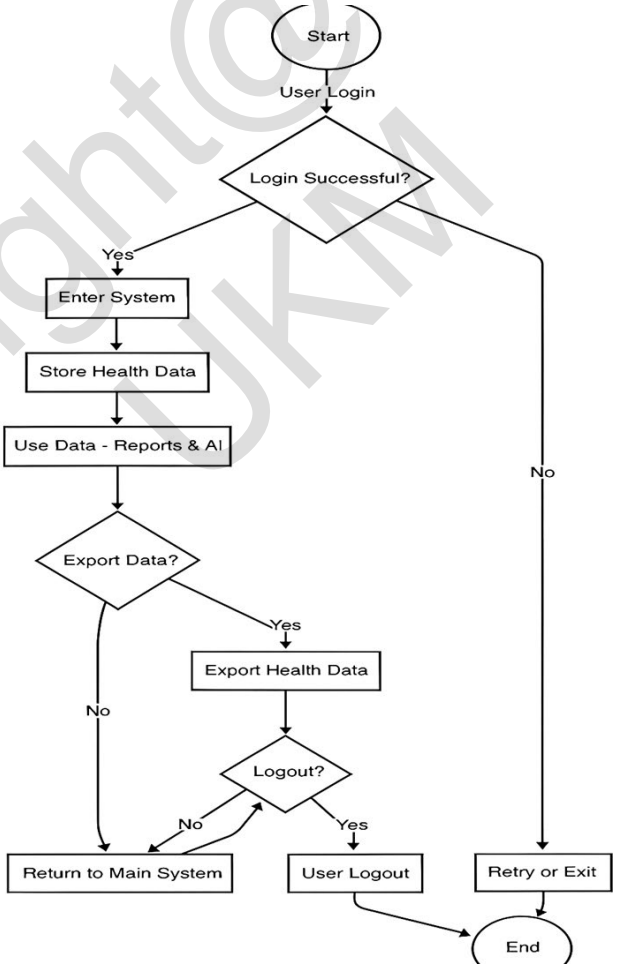
The development of HealthPal adopted the Waterfall model, which is a structured approach consisting of sequential phases such as requirements analysis, design, implementation, testing, and maintenance (Balaji & Murugaiyan, 2012). This method was chosen because of its clarity in defining milestones, which is crucial for managing the project scope, including cross - platform user interface development, backend operations, database management, and artificial intelligence integration.

Functional requirements were determined through user surveys (with 32 respondents), focusing on aspects like user registration, health data input, caregiver monitoring, and notifications. Non - functional requirements include performance (timely response), security (data protection), usability (age - appropriate design), and localization (support for English, Chinese, and Malay). The system hardware and software requirements follow the Android

Studio specifications, and it is recommended to use 8GB of RAM and an Intel i5 processor for optimal performance.

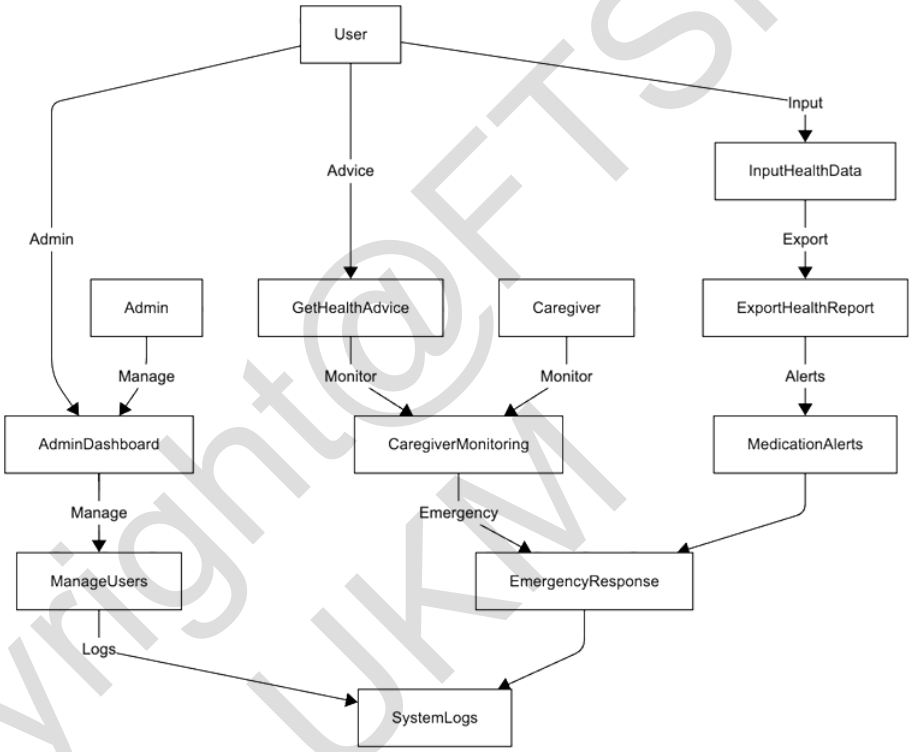
The system architecture combines React Native (for the frontend) and Node.js (for the backend). Google Colab is used for database management, and TensorFlow is employed for artificial intelligence - based recommendations. System models (activity diagrams, use case diagrams, and sequence diagrams) are used to visualize the workflow and ensure alignment with user needs. The database design focuses on storing user information, health data, and personalized recommendations. The structures of entities such as UserEntity and HealthRecordEntity are designed to support efficient data retrieval.

The Activity Diagram visually represents a sequence of actions in the HealthPal system. It shows how users interact with the application from login to performing various health-related activities. This helps developers understand the workflow and optimize user interactions.



FIigure 1 Activity Diagram

Use case diagrams are often called behavioral diagrams and are used to describe a set of actions (use cases) that a system or systems (subjects) should or can perform in collaboration with one or more external users (actors) of the system. Use cases describe how users use the system to achieve specific goals, while goals are what actors want to achieve by using the system.



FIigure 2 Use case diagram

4.0 RESULTS

HealthPal has successfully built a health management application with core functions. Its login interface supports two roles: the elderly and doctors. Users can complete the login operation by entering their username, password and selecting the corresponding identity, providing exclusive health management entrances for different groups. In the health record module, the application can accurately record multiple health data such as weight, height, heart rate, blood pressure, and sleep duration. It can also intelligently identify abnormal indicators (such as abnormal heart rate) and mark "Abnormal" to remind users. Each record is equipped with a "Comment" button, which is convenient for doctors or caregivers to add professional health advice.

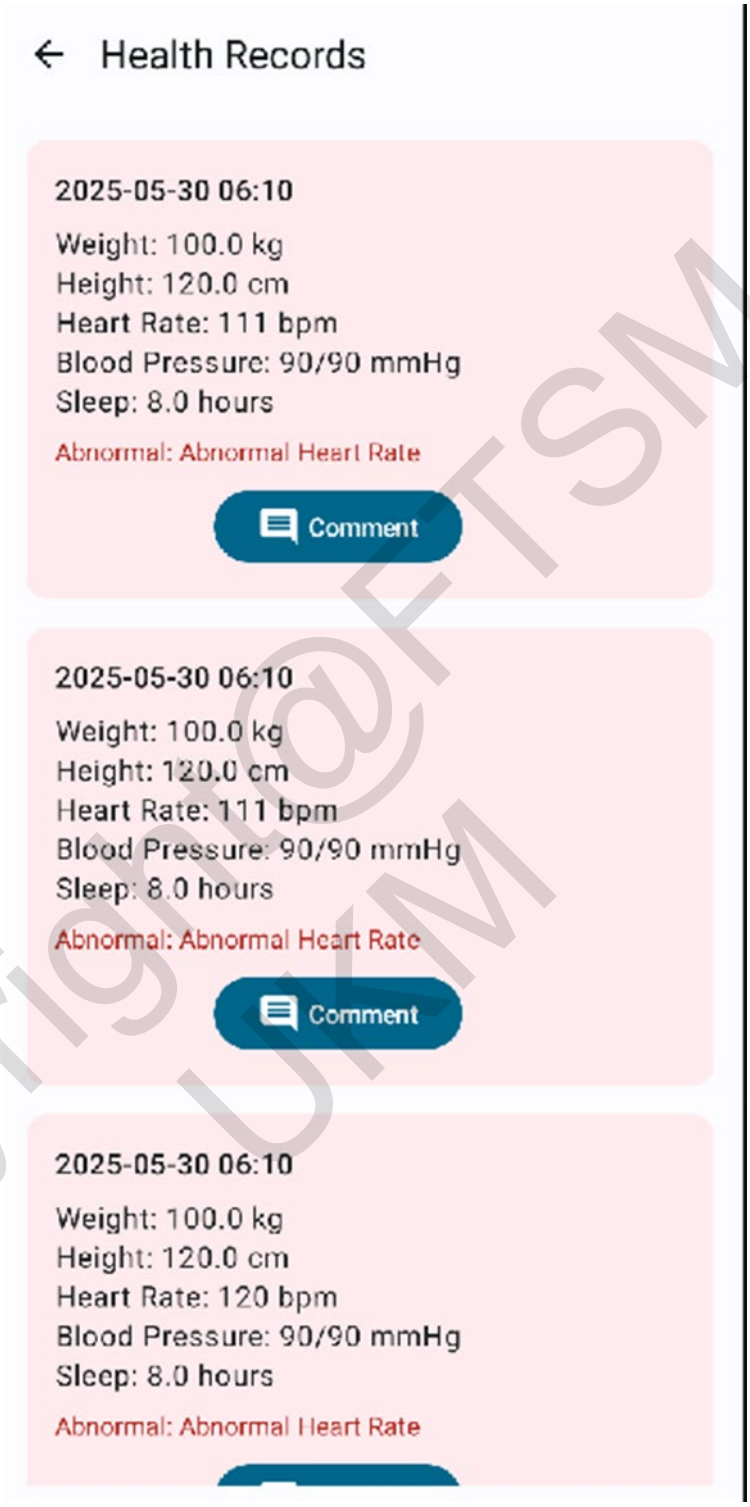
In terms of functional implementation, HealthPal has achieved the goal of centralized health data management, covering multi-dimensional monitoring needs such as diet, exercise, and sleep, which is consistent with the concept emphasized by Smith and Brown (2020) that "health management needs to integrate multi-dimensional data". Its simple login interaction designed for elderly users and potential gamification expansion planned for children (such as the subsequent addition of exercise check-in reward mechanisms) echo the trend mentioned by Anon (2018) that mobile health applications need to adapt to the needs of different groups, making health management more targeted and practical.

In practical application, users can quickly enter and view health information through the intuitive interface, and data synchronization and storage are stable, solving problems such as scattered traditional health management tools and complex operations. This not only conforms to the guideline of WHO (2021) that "health technology should be convenient and accessible", but also provides a basis for user health intervention through accurate data recording and abnormal early warning, preliminarily verifying the value of the project in improving the health management experience of vulnerable groups.

The users can log in by giving their username and password. There are options at the bottom of the page to choose from "Elder" and "Doctor" roles, where the user can select whether he or she is logging in as a doctor or an old person. Account link and password reset links are also provided to users who need a new account or forgot their password.

FIigure 3 Login Page

This is user comments about their health records. Users can input and submit their comments. It also shows a list of historic comment records so that users are able to read past comments and corresponding health record details. It facilitates communication between the doctors and the elderly for better management of health.



FIigure 4 Health Record Page

Figure 5 shows the elderly user's homepage, with his/her health information and feedback displayed. At the top of the page is the name and contact information of the doctor they are seeing now. Below it are several function buttons, such as "Health Records," "Medication Reminders," and "Doctor Feedback." The page also contains a "Latest Health Data

Overview" section, where crucial health data (e.g., weight, heart rate, blood pressure) are represented in charts so the elderly user can monitor his/her health.

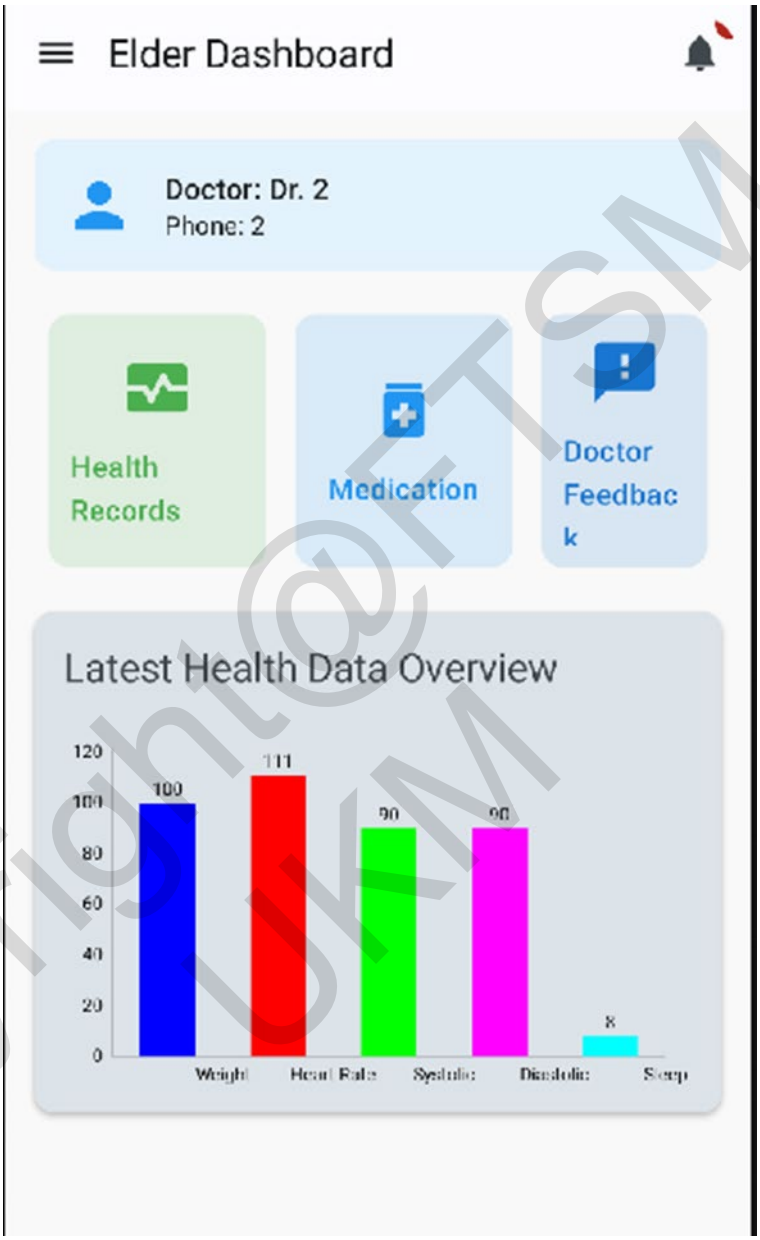
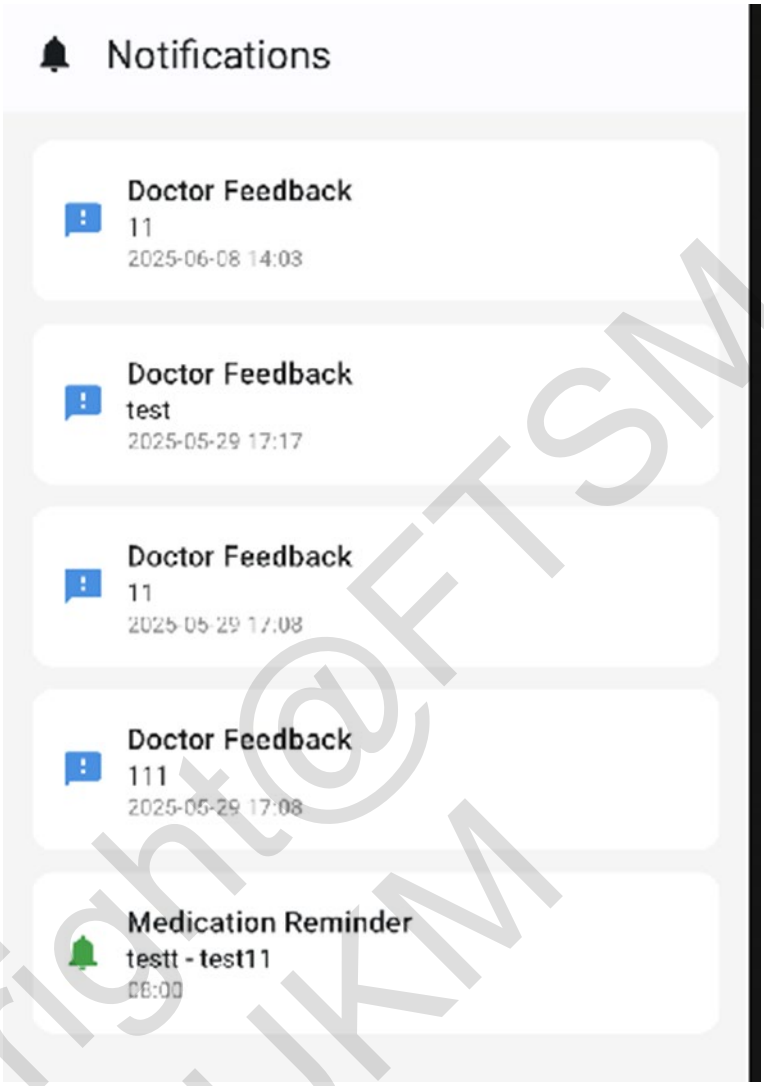


FIgure 5 Elder Dashboard Page

Figure 6 has a list of all system messages and alerts, including doctor comments and medication reminders. Each notification has a title and date so the user can stay current with the latest health details and recommendations.



FIigure 6 System Notifications Page

5.0 CONCLUSION

HealthPal, as a health management application designed specifically for the elderly and children, has achieved targeted responses to the health management needs of these specific groups by integrating functions such as diet, exercise, sleep tracking, and caregiver support. The core achievement of the project lies in building a centralized health data management platform. It not only solves the problems of scattered traditional tools and complex operations but also improves the user experience of the elderly and children through an intuitive interface and potential gamified design, preliminarily verifying its practical value in improving the health management of vulnerable groups.

However, HealthPal still has certain limitations. Some elderly users may require additional guidance to adapt to the system; the accuracy of AI-based personalized recommendations depends on the completeness and authenticity of data; since it is not

connected to smart devices, all health data must be manually entered by users, which may affect the accuracy and timeliness of the data; meanwhile, user privacy protection must continuously comply with strict standards to ensure the security of user health data. These issues reflect the challenges faced by the application in practical implementation and also provide directions for subsequent optimization.

In the future, the practicality of HealthPal can be enhanced through several improvement measures: adding health data analysis reports to provide more detailed trend interpretations; optimizing machine learning models to improve the accuracy of personalized recommendations; introducing a social interaction module to promote the formation of a healthy community; integrating voice assistant functions to further enhance the operational convenience for elderly users. Through continuous research, development, and improvement, HealthPal is expected to build a more complete user base system, providing more comprehensive and intelligent health management support for the elderly and children, and ultimately achieving long-term assistance in improving users' overall health and well-being.

6.0 REFERENCES

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