CHAPTER 1. INTRODUCTION

1.1. Research Background

In recent years, the integration of technology into healthcare has become increasingly crucial, leading to significant advancements in hospital management systems. This thesis focuses on the development of a hospital management application utilizing Flutter technology. The primary goal is to enhance healthcare efficiency and accessibility. The hospital management application will include features such as patient registration, appointment scheduling, seeing doctor schedules, and calling emergency services or an ambulance, as described in Figure 1.1. Flutter, a UI toolkit developed by Google, will be employed for this purpose. Flutter enables the development of natively compiled applications for both mobile (iOS and Android) platforms from a single codebase, ensuring high performance and a consistent user experience across devices. This framework is chosen due to its ability to simplify the development process, reduce costs, and provide a high-quality user interface.

The motivation behind developing this hospital management application is rooted in the need to simplify medical procedures and improve the overall patient and healthcare provider experience. Traditional systems often suffer from fragmentation, limited interoperability, and user-unfriendly interfaces, which hinder effective healthcare delivery. Patients and medical teams encounter difficulties in accessing and managing health information seamlessly. By creating a unified hospital management application, this thesis aims to mitigate these challenges, thereby enhancing the overall patient and healthcare provider experience. The application will empower patients to take a more active role in their healthcare by providing easy access to their medical information and facilitating seamless interactions with medical staff. Additionally, it will streamline administrative processes for healthcare providers, allowing them to focus more on patient care.

Flutter is chosen as the development framework for several reasons. Firstly, its ability to develop cross-platform applications means the app can be deployed on both Android and iOS devices, reaching a broader audience. This cross-platform capability ensures that the application is accessible to a diverse user base, regardless of their preferred mobile operating system. Secondly, Flutter offers a rich set of pre-designed widgets and a reactive framework, enabling rapid development and a responsive, visually appealing user interface. Lastly, Flutter's hot-reload feature allows for quick iterations and testing, enhancing the development efficiency and enabling faster implementation of user feedback.

The development of the hospital management application will be carried out in several phases to ensure a comprehensive and user-centric solution. The initial phase involves a detailed needs assessment to identify the specific requirements of both patients and healthcare providers. This will

include surveys, interviews, and analysis of existing hospital management systems to gather insights into the desired functionalities and pain points.

Based on the needs assessment, the application's architecture will be designed to include key modules such as user authentication, appointment scheduling, notifications, and secure messaging. Each module will be carefully crafted to ensure ease of use, security, and efficiency. The user interface will be designed with a focus on intuitive navigation and accessibility, ensuring that users can easily interact with the application regardless of their technical proficiency.

One significant research gap identified in current hospital management systems is the handling of appointment statuses. Specifically, after a patient schedules an appointment, the system often lacks clear status updates and detailed information until the appointment is confirmed by a doctor. To address this, the proposed application will include a feature where the appointment status remains as 'pending' until it is accepted by a doctor. Once the appointment is accepted, the application will update the status and provide a 'detail appointment' button for patients to view comprehensive information about their upcoming visit. This functionality aims to improve communication and clarity for patients, ensuring they are well-informed about the status of their appointments.

The development phase will leverage Flutter's capabilities to build the application. The single codebase approach will facilitate the creation of a consistent user experience across both Android and iOS platforms. The backend will be powered by a robust and scalable database, capable of handling large volumes of sensitive health data securely. Integration with existing hospital information systems will be considered to ensure seamless data flow and interoperability.

Rigorous testing will be conducted throughout the development process to identify and address any bugs or usability issues. This will include unit testing, integration testing, and user acceptance testing, ensuring that the application meets the highest standards of quality and reliability. Feedback from initial users will be incorporated into iterative improvements, refining the application based on real-world usage.

Upon completion, the application will be deployed and monitored to ensure its effectiveness in enhancing hospital operations and patient care. Ongoing support and updates will be provided to address any emerging issues and to continuously improve the application's functionality and user experience.

This thesis will document the entire development process, from conception to deployment, demonstrating how Flutter technology can be utilized to create an efficient, accessible, and user-friendly hospital management application. Through this work, the potential for technology to transform healthcare delivery will be highlighted, showcasing the benefits of modern app development frameworks in addressing critical needs within the healthcare sector.
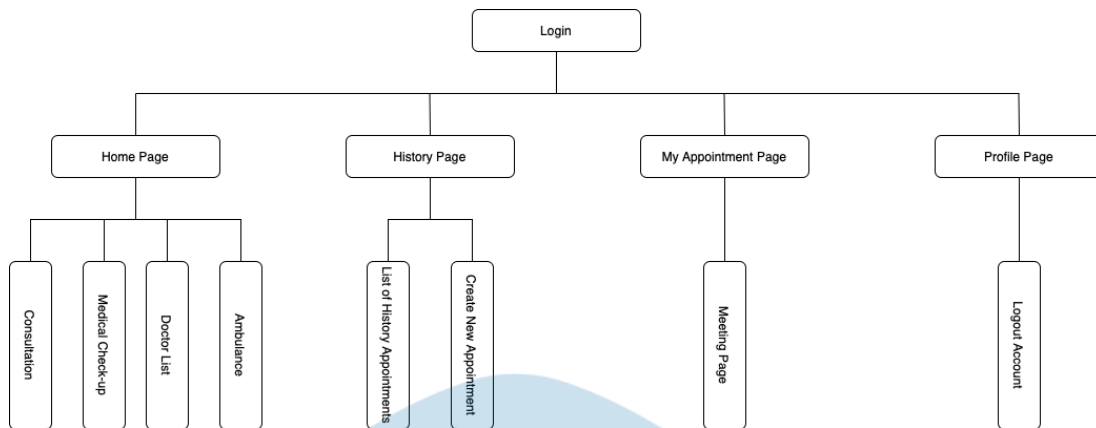
Figure 1. 1 Site Map Diagram

1.2. Research Status Analysis

The analysis of the provided journals reveals several key themes in the utilization of technology, particularly Flutter, in healthcare applications. Firstly, there is a significant focus on understanding the performance and development aspects of applications using cross-platform technologies like Flutter. These studies provide insights into the technical capabilities and limitations of Flutter in real-world application scenarios [2]. For example, insights into the efficiency and responsiveness of Flutter applications highlight its advantages in development speed and performance compared to native solutions [2].

Secondly, there is a growing interest in the design and development of healthcare-specific applications using Flutter. Researchers exemplify this trend by exploring the potential of Flutter in enhancing patient care and hospital management systems. The development of mobile healthcare application prototypes using Flutter, as discussed in these studies, emphasizes its ability to streamline patient management and improve overall hospital workflow [16]. Such research contributes to the understanding of how mobile technology can be leveraged to improve healthcare delivery and patient outcomes [19].

Furthermore, comparative studies shed light on the performance and stability of Flutter compared to other frameworks. These comparisons provide valuable insights into how Flutter stacks up against frameworks like React Native in terms of performance, stability, and user experience [6]. This information is crucial for developers and stakeholders in making informed decisions regarding technology selection for healthcare application development, ensuring that the chosen technology meets the specific needs of healthcare environments [11].

Additionally, innovative use cases of Flutter in healthcare are explored, investigating applications in augmented reality (AR) and real-time object detection. The use of Flutter to develop AR applications can be applied in medical training and patient education [12]. Similarly, using

Flutter for real-time object detection has implications for diagnostic imaging and other medical applications [13]. These studies highlight the versatility of Flutter in addressing diverse healthcare challenges and incorporating emerging technologies into medical solutions [13].

Moreover, feasibility and acceptability studies offer valuable insights into user preferences and adoption challenges, particularly in the context of Flutter-based healthcare applications. Understanding user needs and expectations is crucial for the successful implementation and uptake of technology-driven healthcare solutions [8]. These studies suggest that user-centric design and thorough testing are essential to meet the specific demands of healthcare professionals and patients [9].

1.3. Significance of The Study

1.3.1. Formulation of Problems

The formulation of problems stems from the existing challenges and gaps identified in the healthcare landscape, coupled with the potential of technology, particularly Flutter Dart, to address these issues. The problems that necessitate attention include:

a. Current healthcare systems often lack integration, leading to fragmented access to essential medical services for patients.
b. Traditional appointment scheduling processes are often cumbersome and time-consuming, hindering patients from accessing timely medical consultations.
c. Many hospitals struggle with outdated management systems, resulting in suboptimal patient care and resource utilization.
d. Communication between patients and healthcare providers, especially during emergencies, is often inefficient and delayed.

1.3.2. Limitation of Problems

Despite the recognition of these problems, there are several limitations that impede their resolution:

a. Existing healthcare applications may lack the robustness and flexibility required to address diverse patient needs and preferences.
b. Development and implementation of comprehensive healthcare solutions require significant resources, including time, expertise, and financial investment.
c. Resistance to change and limited digital literacy among healthcare professionals and patients may hinder the adoption of new technologies.
d. Healthcare applications must adhere to stringent regulatory requirements to ensure patient privacy and data security, adding complexity to the development process.

1.3.3. Research Objectives

To mitigate the identified problems and limitations, the research aims to achieve the following objectives:

a. Implement a user-friendly hospital application using Flutter Dart that integrates various healthcare services and functionalities.

b. Improve the overall patient experience by providing convenient access to medical services, streamlined appointment scheduling, and seamless communication channels.

c. Enhance hospital management systems through the implementation of efficient resource allocation, and data-driven decision-making processes.

d. Ensure that the developed application complies with relevant regulatory standards and safeguards patient privacy and data security.

1.3.4. Benefits of Research

The research offers several benefits to various stakeholders within the healthcare ecosystem:

a. The developed hospital application enhances patient care by providing timely access to medical services, facilitating proactive health management, and fostering patient-provider communication.

b. Streamlined appointment scheduling, optimized resource allocation, and real-time data insights contribute to improved operational efficiency within healthcare facilities.

c. By reducing administrative burdens and minimizing inefficiencies, the research results in cost savings for healthcare providers and patients alike.

d. The adoption of Flutter Dart technology in healthcare applications contributes to the advancement of digital healthcare solutions, paving the way for future innovations in the field.

1.4. Schedule

Scheduling will be implemented in this thesis as follows:

No	Activities	Weeks										
		1	2	3	4	5	6	7	8	9	10	11
1	Literature Review	★										
2	Analysis of needs/ requirements		★									

3	Design			★	★						
4	Coding					★	★	★	★	★	
5	Testing									★	
6	Documentation										★

Table 1. 1 Schedule Table

1.5. Organizational Structure of The Paper

As for the systematic structure, this thesis is divided into five chapters, with explanations for each chapter as follows:

Chapter 1 Introduction

In the first chapter, the researcher explains the background of the issue and the Flutter framework used in the development of the hospital application, which is the main topic of this thesis. The researcher also explains the problem identification, limitations of the problem, research objectives, benefits of the research, and schedule.

Chapter 2 Related Technologies and Theories

In the second chapter, the researcher explains the theories and applications that have been previously established.

Chapter 3 System Requirements Analysis

In the third chapter, the researcher explains the related theories used in this research.

Chapter 4 System Design

In the fourth chapter, the researcher explains the workflow and temporary design of the user interface of the application along with activity diagrams and use case diagrams.

Chapter 5 System Implementation

In the fifth chapter, the researcher explains the hardware and software required for the development of this application, as well as displaying the user interface of each feature.

Chapter 6 System Test

In the sixth chapter, the researcher explains the program testing, how to conduct the test, and the results of those tests.

Chapter 7 Conclusion and Prospect

In the seventh chapter, the researcher explains the conclusion of this thesis and the input that can be used for future application development.