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USER ENGAGEMENT ENHANCEMENT VIA SELF-CHECK WEB-BASED SYSTEM

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Abstract: *The patient admission process is one of the most important functions in a hospitality environment, especially related to hospitals and clinics. Each year, these institutions handle a lot of repetitive tasks, yet many complaints arise due to a low level of user engagement, higher queuing time, and low response time. Thus, this project focuses on the development of a web-based or digital Self-Check-In Patient Admission System for UCSI Hospital. The system aims to improve processes and streamline the workflow of staff, patients, and doctors. The current manual registration allows patients to make appointments online based on the expertise and availability of the doctor. It also allows administrators to manage appointment records and allows doctors to update their schedules efficiently. Planning, design, development and testing are the systematic processes followed in building the system built with PHP, MySQL, HTML, CSS, and JavaScript. The implementation of this technology improves the efficiency of the overall hospital workflow, reduces paperwork, and shortens waiting times.*

Keywords: *Self Check-In System, Hospital Management System, Appointment Booking, Web-Based Application, Patient Admission System*

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Introduction

System Background and Context

This project presents the development of a web-based Self-Check-In Patient Admission System for UCSI Hospital to improve and digitize the existing manual registration process. Currently, patients are required to queue at the registration counter, fill out physical forms, and wait for staff confirmation before securing an appointment, which often results in long waiting times, congestion, and increased stress for both patients and hospital staff. Manual data entry also increases the risk of human errors, such as incomplete or inaccurate records, which may affect service quality. To address these challenges, the proposed system enables patients to book appointments online by selecting medical specialties, choosing available doctors, and picking preferred dates and time slots, with all information stored in a centralized database for accurate and organized record management. The system also incorporates role-based access control, allowing administrators to review and manage appointment requests while doctors can update their availability schedules. Overall, the system aims to enhance operational efficiency, reduce staff workload, improve patient satisfaction, and support the hospital's digital transformation toward a more modern and patient-centered healthcare service.

Problem Statements

The current patient admission process at UCSI Hospital still relies on manual registration procedures, where patients are required to queue at the counter and complete physical forms before their information is manually entered into the hospital system by administrative staff. This repetitive and paper-based process increases the likelihood of human errors, such as misspellings, incomplete data, misplaced documents, or incorrect record entry, which may negatively affect patient safety and service quality. During peak hours, registration counters often become overcrowded, resulting in long waiting times and increased frustration, particularly for patients who are unwell or in discomfort. In addition, hospital staff must allocate substantial time to handling paperwork, verifying patient information, and performing manual data entry, which increases workload, reduces productivity, and limits their ability to focus on more critical tasks. The storage and retrieval of physical records also pose organizational challenges, slowing down access to important patient information. These combined issues highlight inefficiencies in the current system and demonstrate the urgent need for a more streamlined, accurate, and technology-driven solution to improve operational performance, reduce waiting times, and enhance overall patient satisfaction.

System Objectives

Based on an analysis of current operational challenges and in line with the goals of this project, the development of UCSI Hospital's self-service patient admission system focused on several key objectives aimed at improving patient order management and transparency.

1. To automate the patient check-in and admission process
2. To minimize waiting time and improve patient flow
3. To reduce data entry errors and improve data accuracy
4. To enhance operational efficiency for hospital staff
5. To improve patient satisfaction and hospital image

System Scope

The Self Check-in Patient Admission System is a web-based platform developed to manage patient appointments and doctor availability at UCSI Hospital. The system enables patients to book appointments online by selecting a medical specialty, choosing a doctor, and picking an

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available date and time before visiting the hospital. All submitted information is stored in a centralized database to ensure organized and accurate record management. Doctors can log in to update their availability schedules, while administrators can monitor, review, and manage appointment records through an admin dashboard. However, the system does not include advanced features such as online payment integration, automatic SMS or email notifications, mobile application support, or direct integration with the hospital's full medical record system, as it was developed primarily for academic and demonstration purposes.

User Scope

The system involves three main types of users: patients, doctors, and administrators, each with specific roles and access rights. Patients can access the system to book appointments, enter personal details, and view their appointment history, but they are not permitted to modify system data or access other users' information. Doctors are provided with secure login access to manage their availability schedules and review their assigned appointments, without administrative privileges. Administrators have full control over the system, allowing them to review appointment requests, update appointment statuses, monitor doctor availability, and ensure smooth system operations. These defined user roles help maintain structured workflow, data security, and proper access control within the system.

Literature Review

In recent years, healthcare institutions worldwide have increasingly adopted digital registration and self-service check-in systems to improve patient flow and reduce administrative inefficiencies (Lammila-Escalera et al., 2025; Loukili et al., 2024; Sehgal et al., 2024; Zhang et al., 2025). Traditional manual registration processes are often associated with long waiting times, clerical errors, and increased workload for hospital staff (Alqahtani et al., 2024; Nino et al., 2021; Spaite et al., 2002). On the other hand, several studies also indicate that implementing self-service kiosks in healthcare settings significantly reduces patient waiting time and minimizes human errors in data entry (Coyle et al., 2019; Gregorio, 2010; Kokkinou & Cranage, 2013; Mahmood et al., 2020; Pacheco et al., 2020).

Similarly, (Khashu, 2025) emphasizes that digital check-in platforms enhance operational efficiency, improve accessibility, and contribute to higher patient satisfaction by streamlining the admission process. These systems allow patients to input their information directly into a centralized database, improving data accuracy, security, and record management. In the Malaysian healthcare context, hospitals such as KPJ Healthcare and Sunway Medical Centre have introduced self-service kiosks and online pre-registration systems to reduce congestion at admission counters. These implementations demonstrate that digital solutions can enhance workflow efficiency while maintaining service quality (Cardoso et al., 2004; Muhamad et al., 2012; Şişu et al., 2024). Furthermore, research on a cloud-based appointment system using QR code verification reported improvements in system reliability, patient satisfaction, and data accuracy (Kosalairaman et al., 2025; Muhamad et al., 2012; Suhaimi, 2025).

Methodology

The study adopted design science research methodology, where an artefact is planned, developed, modified, and tested before actual usage. The application utilizes the PHP programming language with the Apache Server engine and MySQL database. The development started with the data collection process from the stakeholders. In addition, the research also looks at the supporting documentation, reports, and manual procedures. Next, the artefacts was developed and tested.

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Findings

The Data Flow Diagram (DFD) illustrates how information moves within a hospital appointment management system involving three main users: the patient, admin, and doctor. The process begins when a patient provides personal and appointment details through the Register Appointment (1.0) process, which stores the information in the Appointments database (D1). The admin can then view and manage appointments (2.0) by accessing patient and appointment information from the system. Next, the system performs doctor verification (3.0) by checking the doctor's schedule and availability stored in the Doctor Availability database (D2) to ensure the appointment can be accommodated. Finally, the Generate Appointment Records (4.0) process compiles patient records and appointment data to produce reports, which are stored in the Report Data database (D3). Overall, the diagram shows how data flows between users and system processes to ensure appointments are registered, verified with doctor availability, and properly recorded for reporting purposes.

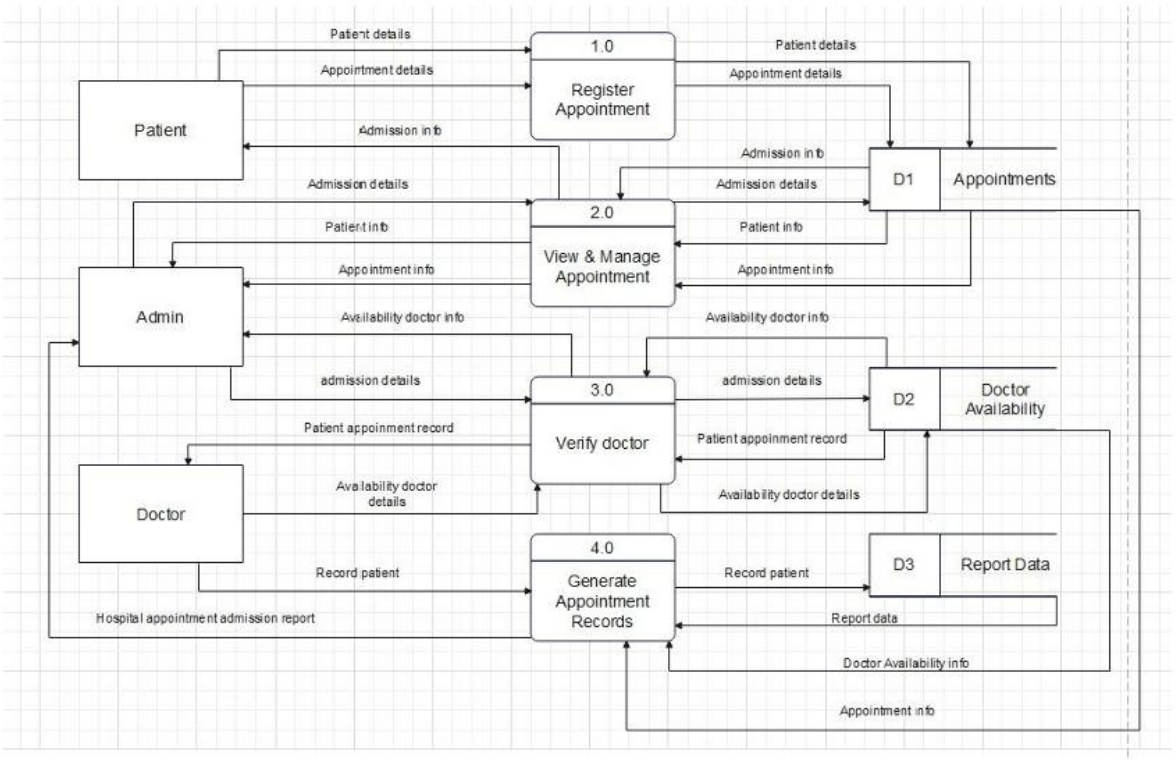

Figure 1: Data Flow Diagram

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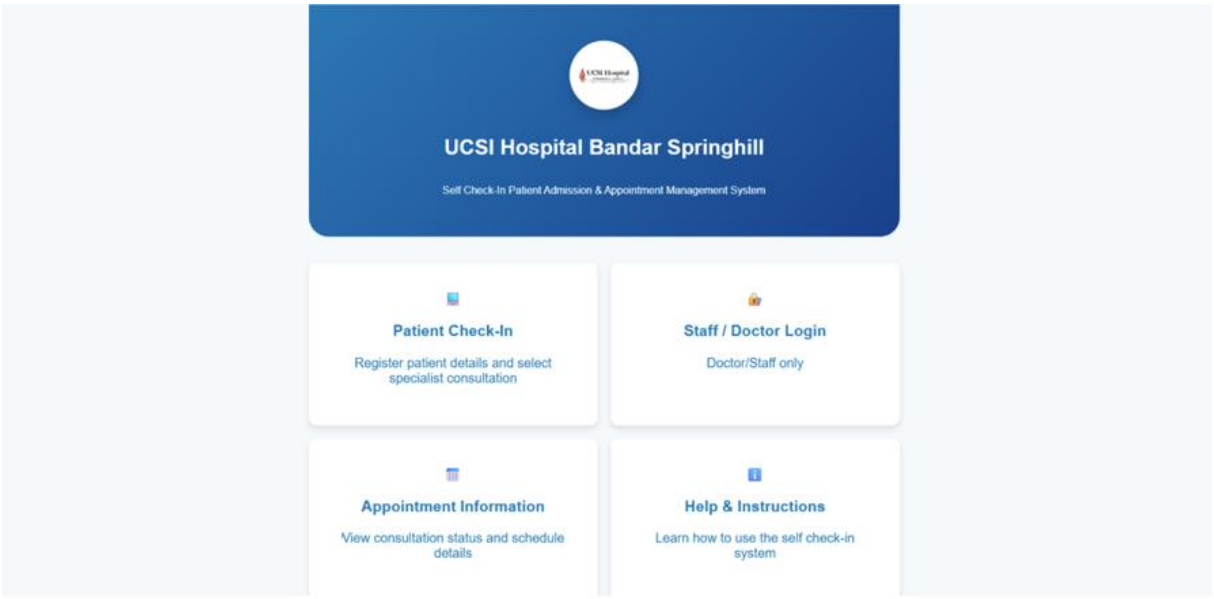

Figure 2: Dashboard

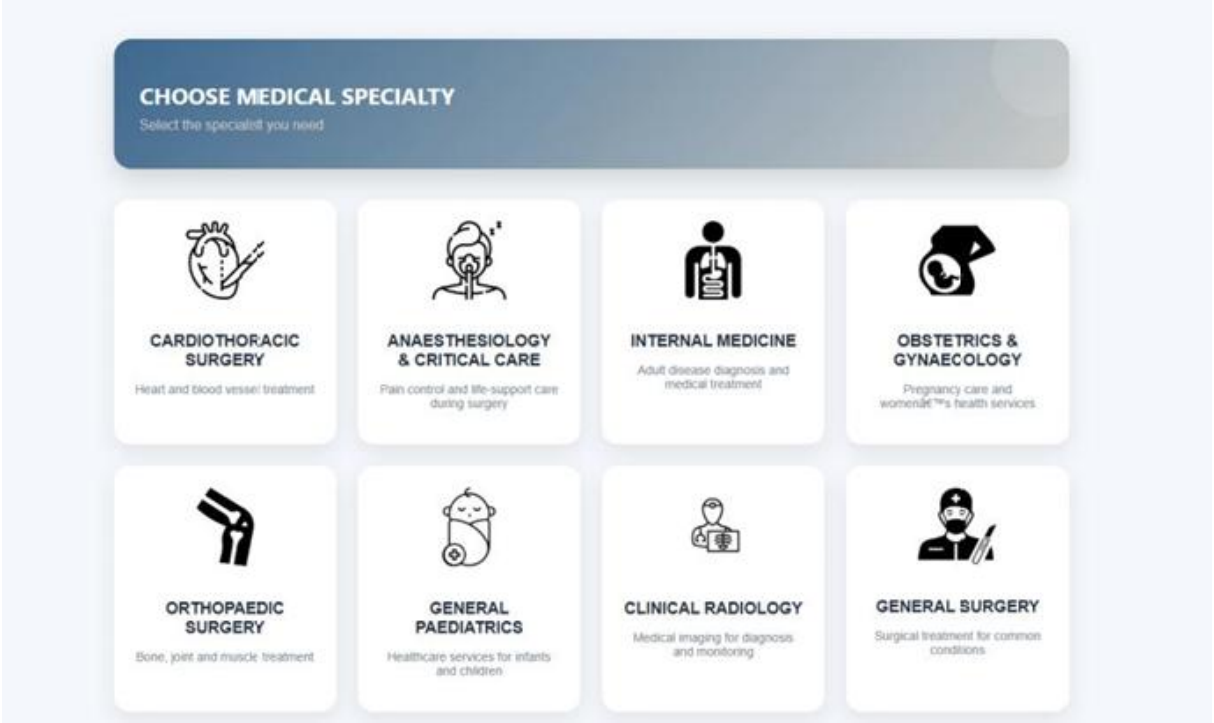

Figure 3: Menu

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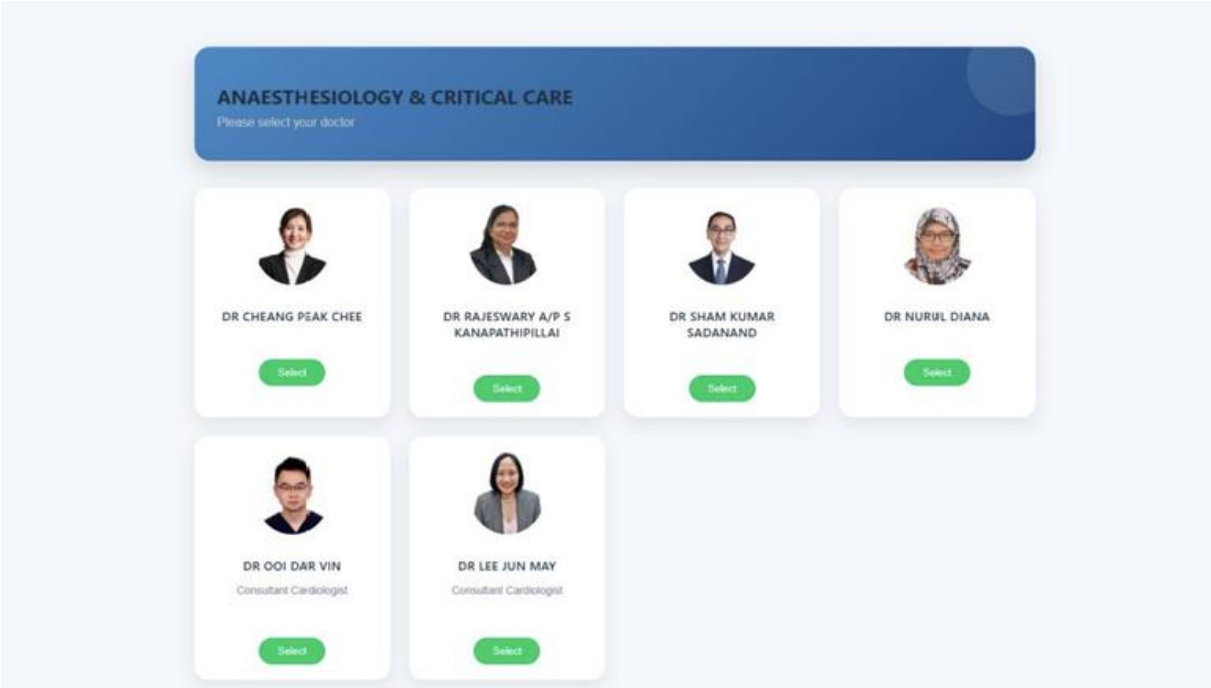

Figure 4: User Page

Conclusion

The study was conducted to illustrate the development of a web-based information system for patient admission. A design science research methodology was adopted; an artefact was produced and tested before actual usage. A follow-up study was also conducted to determine the impact and potential of the system, especially for the final rollout process. The system was able to reduce waiting time, create a transparent workflow, and utilize the latest technology to enhance user engagement, reduce complaints, and foster better transparency.

However, several limitations were also identified throughout the process. First, the system is limited to patient admission and booking only – other crucial functions are not included. We suggest future development to develop a full system that integrates all the operations in the hospital and clinic. Second, the system did not have device-to-system integration and only relied on QR code or manual data insertion. We suggest that researchers and developers to integrate the device-to-system concept, such as integration with Malaysia identification card, to speed up the data entry process.

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