Design and Development of an Interactive Prayer Schedule Application for Digital Displays

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Abstract

The advancement of digital technology has increased the demand for practical and interactive access to religious information, including prayer schedules. This study aims to design and develop an interactive prayer schedule application that can be displayed through digital screens. The development process involves several stages, including requirements analysis, system design, implementation, and testing. The application is built on a web-based platform to ensure flexible access across various devices. Testing results indicate that the system can display accurate and real-time prayer schedules while providing an intuitive user interface. This research is expected to contribute to the digitization of worship information and offer an effective solution for mosques, prayer rooms, and other religious institutions.

***Keywords**:* Prayer Schedule Application, Digital Display, Software Engineering, Interactive System

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Introduction

The rapid advancement of digital technology has significantly transformed how information is accessed and utilized in various sectors, including religious institutions. Prayer schedules, which were previously displayed through printed posters, manual announcement boards, or static digital panels, are now transitioning toward more dynamic and interactive systems. These changes reflect the growing need for accurate, real-time, and easy-to-manage digital religious information as communities increasingly rely on technology for daily routines [1]. The integration of digital solutions enables institutions such as mosques and prayer rooms to enhance service quality and engagement with worshippers.

Digital display systems, or digital signage, have become one of the most efficient mediums for delivering information in public spaces due to their ability to update content dynamically and present visually appealing interfaces. Several studies have highlighted that digital signage improves communication effectiveness, especially when supported by interactive features that allow user engagement and content personalization [2].

Research on prayer schedule applications has primarily focused on mobile-based platforms, emphasizing features such as prayer time notifications, Qibla direction, and hijri calendar integration [3]. Although these applications support individual needs, they are not optimized for large-screen environments used in public religious spaces. Studies also show that many mosques still use conventional prayer boards that require manual updating, leading to inconsistencies and human error [4]. This gap demonstrates the need for a more robust and userfriendly digital solution that can automatically synchronize prayer times and present them attractively on digital displays.

From a system development perspective, interactive applications for religious information require a combination of accurate prayer time algorithms, intuitive interface design, and seamless device compatibility. Previous works on interactive public information systems indicate that usability and display clarity play crucial roles in improving user satisfaction and comprehension [5].

The main research problem addressed in this study is the lack of digital signage applications specifically designed for prayer schedules with interactive features, automated updates, and web-based accessibility. To solve this problem, the research focuses on developing a system that ensures accurate prayer time calculations, provides a modern and intuitive interface, and enables efficient management for mosque administrators. The purpose of this scientific article is to present the design, development process, and system testing results of the interactive prayer schedule application, which is expected to support digitalization efforts in religious institutions and enhance the overall worship experience

Literature Review

Research on the digitization of religious information systems continues to develop as digital platforms become more widely adopted in public facilities. Several studies emphasize that the shift from manual to digital religious information displays such as prayer schedules improves information accuracy and efficiency, supporting the arguments presented in previous studies regarding digital transformation in worship environments [1]. The increasing relevance of digital displays for religious information is aligned with trends in smart public services, where automation and real-time updating capabilities are essential for ensuring reliability and usability.

Prayer time calculation algorithms form the fundamental core of digital prayer schedule systems. Algorithms developed by Islamic institutions and researchers such as solar positionbased calculation models provide standardized methods to determine the five daily prayer times accurately across different regions [6]. This supports the importance of accuracy highlighted in prior literature related to prayer time applications, particularly mobile-based platforms, which emphasize the need for precise astronomical computations [3].

Digital signage systems, which serve as dynamic public information tools, have been widely studied for their effectiveness in increasing user engagement. Research indicates that digital

signage can outperform traditional bulletin boards due to its versatility, visual clarity, and remote management capabilities [2], [7]. These technological advantages are particularly relevant in religious settings where the consistency of displayed information such as prayer schedules, announcements, or event notifications is critical. The literature also notes that digital signage can enhance communication effectiveness in environments where audiences rely on quick and clear information delivery.

User interface (UI) and user experience (UX) design principles are also essential in the development of interactive display systems. Studies show that clear typography, high contrast, and responsive layout significantly improve content readability on large screens [8]. These findings are consistent with the need for intuitive and accessible interfaces mentioned in earlier studies on digital religious applications, supporting the relevance of incorporating UX considerations into prayer schedule displays [2]. Furthermore, interactive visual elements are known to enhance user engagement, which aligns with the goal of designing more dynamic and user-friendly prayer schedule systems.

Another body of literature examines mobile-based prayer applications, which typically offer features such as prayer time reminders, Qibla compass tools, and Hijri calendar integration [9]. Although these applications provide valuable services for individual users, they are not optimized for large digital screens or public environments. As noted in earlier studies [3], mobile platforms lack the spatial design considerations necessary for public display environments. This limitation reinforces the need for a dedicated web-based system specifically tailored for widescreen digital prayer schedules.

Web-based information systems offer strong advantages in terms of compatibility, maintainability, and accessibility. Research demonstrates that web platforms allow centralized management, real-time updates, and cross-device functionality, making them suitable for public installations such as digital prayer displays [10]. These capabilities align with the broader need for flexible and sustainable digital solutions highlighted in previous studies on interactive religious information systems [1]. The literature therefore supports the rationale for selecting a web-based architecture in developing an interactive prayer schedule application.

Research Methodology

This study employs a software engineering approach consisting of four key stages: requirements analysis, system design, implementation, and testing. The methodology ensures that the developed interactive prayer schedule application functions accurately and reliably on digital display devices. The requirements analysis stage was conducted through observation of prayer schedule practices in several mosques and short interviews with administrators. This process identified key issues related to manual updating, inconsistencies in displayed schedules, and the need for real-time accuracy. Based on these findings, the functional and non-functional requirements of the system were defined.

The system design stage focused on determining the application's overall architecture and data processing flow. A web-based structure was selected to provide broad accessibility and ensure compatibility with a wide range of digital display devices. The design also included preparing the integration scheme for the prayer time calculation module based on standardized astronomical algorithms. During the implementation stage, the application was developed using web technologies. The prayer time calculation module was implemented according to recognized astronomical methods, while system components were built using modular programming practices to support maintainability and scalability. The digital display layout was designed to support automated content rendering and real-time updates.

The testing stage involved several evaluations, including functional testing to verify prayer time accuracy and system behavior, performance testing to evaluate update speed and system responsiveness, and compatibility testing across different types of digital display devices such as smart TVs and large monitors. This stage ensured that the application performed consistently

in various operational environments. Through this structured methodology, the research aims to produce an application that supports real-time prayer schedule display, simplifies management processes , and enhances the digitalization of religious information systems.

Results

The results of this study indicate that the Mosque Information Display System (MIDS) was successfully designed and developed to meet the operational needs of the mosque in presenting information more quickly, systematically, and efficiently. The system provides an authentication feature as the initial access point to ensure that only authorized administrators can manage the displayed content. During the testing phase, all core functions—such as user login, information management, and data presentation on the display—operated properly without errors. The implementation of the Sign In page demonstrates that the system incorporates a basic security mechanism through the use of a username and password, supporting privacy and data protection for administrators.

Overall, the results confirm that the system is able to provide a digital solution for mosque information management, facilitate administrators in updating and maintaining content and present a simple, functional, and easy-to-understand initial interface.

4.1 Login Page

The Login Page serves as the entry point for system administrators. This page implements a username–password authentication mechanism designed to ensure that only authorized users can access and update mosque information. Testing confirmed that the authentication process runs smoothly and responds accurately to both valid and invalid login attempts.



Figure 1. Login Page

4.2 Schedule Reference Module

The Schedule Reference page allows administrators to manage time-based information such as prayer times, event schedules, or announcements. The module enables the addition, modification, and deletion of schedule data. System testing shows that the schedule updates are stored correctly and can be displayed in real time on the information board.



Figure 2. Schedule Reference Module

4.3 Location Reference Module

This module provides functionality for managing location-based data. Administrators can input predefined locations or designate specific areas related to mosque operations. The Location Reference page ensures structured data storage, helping the system categorize information accurately. All form submissions and updates were validated and processed without errors during testing.

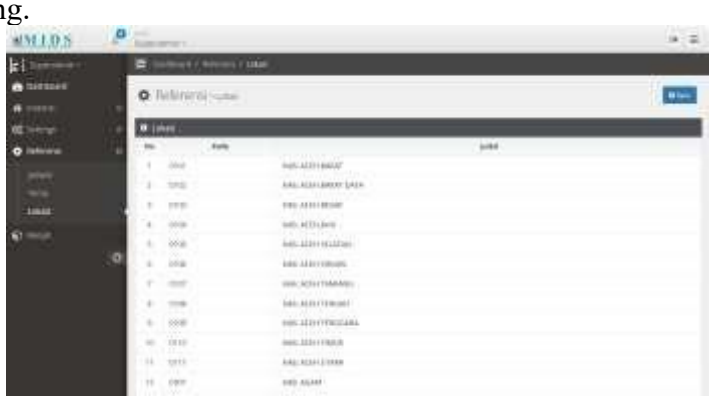


Figure 3. Location Reference Module

4.4 Mosque Data Module

The Mosque Data page contains detailed information related to the mosque, including name, address, contact information, and other descriptive fields. This module enables easy updates to mosque identity data, which is essential for accurate display information. Testing confirmed that all fields are stored consistently in the database and can be retrieved correctly for display purposes.



Figure 4. Mosque Data Module

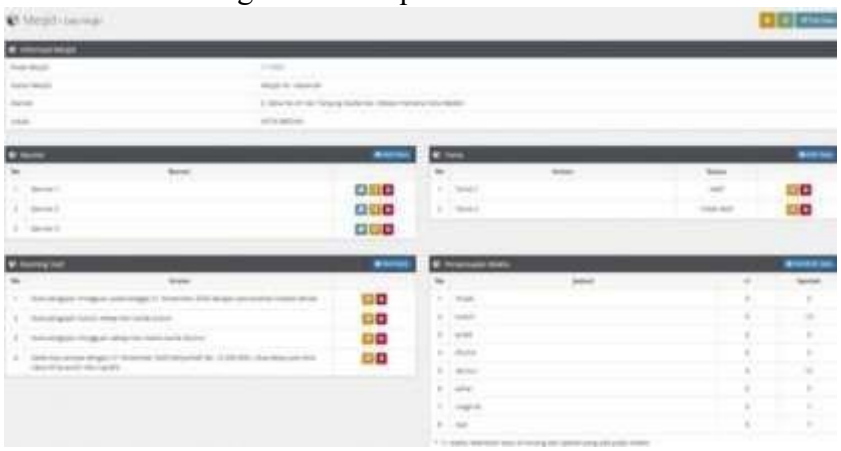


Figure 5. Mosque Data Detail Module

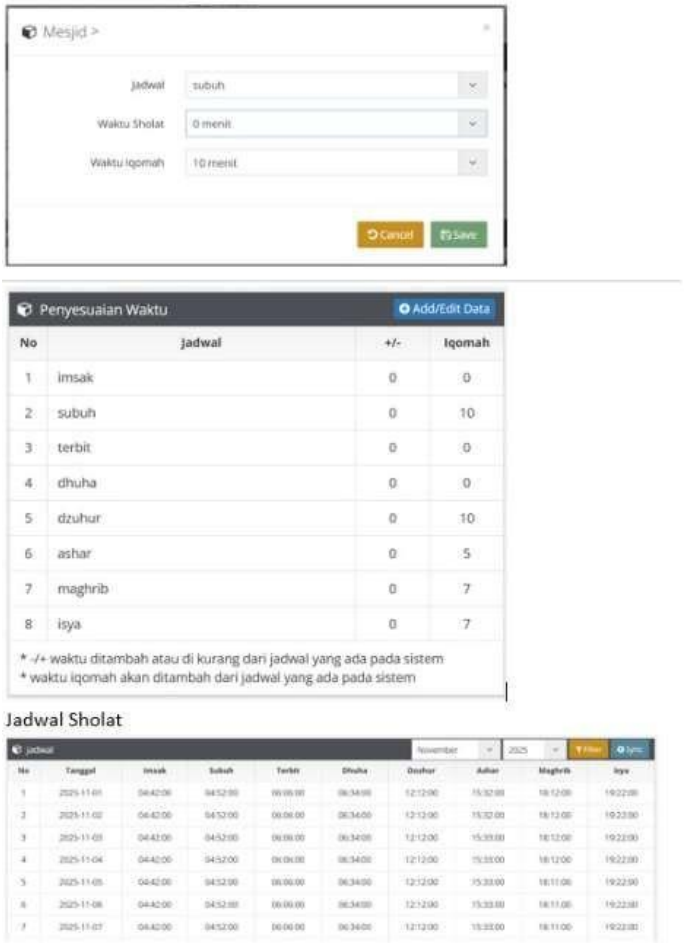


Figure 6. Mosque Timeschedule Module

Conclusion

This study successfully designed and developed an interactive prayer schedule application intended for digital display environments. Through a structured development process consisting of requirements analysis, system design, implementation, and testing, the application demonstrated reliable performance in delivering accurate prayer times and mosquerelated information. Each module Login, Schedule Reference, Location Reference, and Mosque Data functioned effectively and contributed to an integrated information system suitable for operational use in mosques and other religious institutions. The results indicate that the system provides an efficient digital solution for managing and displaying worship-related information in real time. This research contributes to the digital transformation of religious information services by offering a practical and accessible tool that supports administrative workflows and enhances the dissemination of prayer schedules. Future work may include expanding features such as automated data synchronization, multilingual support, or integration with IoT-based display devices to further improve usability and system performance.

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