

ABSTRACT

DESIGN AND DEVELOPMENT OF A GPS-BASED DIGITAL PRAYER TIME CONTROL SYSTEM WITH ANDROID-BASED COMMUNICATION USING API INTEGRATION

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The rapid advancement of digital technology has significantly influenced various application domains, including the provision of accurate religious worship time information. This study aimed to design and develop a Digital Prayer Time Control System integrated with an Android application through Bluetooth communication, GPS-based location determination, and prayer schedule validation using an application programming interface (API). The system employed an ATmega328P microcontroller as the main controller, an RTC DS3231 module for real-time timekeeping, and a seven-segment display as the output interface. The Android application was developed using MIT App Inventor and featured comprehensive control functions, including time and date configuration, location setting (longitude, latitude, and altitude), prayer time adjustment, *iqomah* settings, prayer duration control, buzzer and relay configuration, as well as prayer schedule verification through the MyQuran API. Prayer time calculations were performed using an astronomical calculation (*hisab*) method, with Julian Date employed as the basis for determining the sun's position. Experimental results demonstrated that the system was capable of displaying accurate prayer schedules with a tolerance deviation of $\pm 1-2$ minutes compared to the official prayer timetable issued by the Indonesian Ministry of Religious Affairs. Bluetooth communication between the Android application and the microcontroller was stable, enabling reliable synchronization of configuration settings and consistent data storage. Overall, the proposed system offers a practical, accurate, and user-friendly solution for determining prayer times, suitable for implementation in mosques, prayer rooms, and personal use.

Keywords: Digital prayer time clock; GPS; Julian Date; Bluetooth HC-05; MIT App Inventor; MyQuran API

