

Independent Study Title	Prototyping of Intelligent Medication Platform
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ABSTRACT

Currently, medication non-adherence remains a significant problem, particularly among elderly patients and individuals with chronic diseases. Forgetfulness and limited access to healthcare services often lead to missed doses, resulting in reduced treatment effectiveness and increased health risks. To address these challenges, this research presents the design, development, and technical evaluation of the Intelligent Medication Platform.

The Intelligent Medication Platform is an IoT-based medication management system constructed with an acrylic structure and powered by a Raspberry Pi 4 as the central controller. The system integrates medication reminders, an electric door-lock dispensing mechanism, real-time video conferencing, and activity logging through a web-based interface. Key hardware components include a relay-controlled magnetic lock, speaker, monitor, camera module, and database system.

The system evaluation was designed to emphasize technical performance validation rather than user satisfaction assessment. To ensure comprehensive performance verification, three principal experimental procedures were conducted. First, command execution accuracy was evaluated through 100 consecutive operational cycles for each core system function. Second, power consumption analysis was performed under various operating conditions to determine energy efficiency and operational requirements. Third, 72-hours continuous operation (stress) test was carried out to assess system stability, reliability, and long-term operational endurance.

The results demonstrate high functional reliability, with 98% accuracy in door unlocking, 100% reliability in alarm notification, 96% success rate in video call connectivity, and over 97% accuracy in database logging. The system maintained stable operation with acceptable energy consumption and 100% uptime during the continuous testing period. These findings confirm that the Intelligent Medication Platform is technically reliable, energy-efficient, and suitable for home healthcare deployment to support medication adherence and telemedicine services.

Keywords: Medication Adherence, Internet of Things (IoT), Telemedicine, Raspberry Pi 4, Smart Medication System

