

PROJECT ABSTRACT

IoT Smart Pill Dispenser with Reminders

Medication non-adherence — missed or mistimed doses — is one of healthcare's costliest silent problems, especially for elderly patients managing multiple daily medications.

01 Title

IoT Smart Pill Dispenser with Reminders

02 Introduction / Background

Medication non-adherence — missed or mistimed doses — is one of healthcare's costliest silent problems, especially for elderly patients managing multiple daily medications. Pill organizers help with sorting but do nothing about remembering, and they offer caregivers zero visibility. It is also an ideal final-year project: it combines scheduled electromechanical actuation, real-time clocking, adherence analytics and a caregiver app — giving the student engineering to defend in the viva.

03 Problem Statement

Elderly patients miss doses because reminders are easy to ignore and caregivers have no way to know. This project builds an ESP32-based smart pill dispenser — an 8-compartment rotating carousel that indexes to the correct dose at schedule time, sounds buzzer + OLED reminders until acknowledged, detects missed doses past a grace window, and alerts caregivers through the app.

04 Objectives

- 8-compartment rotating carousel with stepper/servo indexing to the scheduled dose.
- DS3231 RTC timekeeping accurate without WiFi or mains power.
- Buzzer + OLED reminders repeating until user acknowledgment.
- Missed-dose detection: no confirmation within 30-minute grace window → caregiver alert.
- Caregiver app: schedule management, adherence-percentage ring, missed-dose alerts.
- Per-dose timestamp logging for adherence reporting.

05 Proposed System / Working

Built around the ESP32 DevKit with a battery-backed DS3231 RTC (± 2 ppm), a stepper/servo-driven 8-compartment carousel with dispensing chute, a 0.96" OLED and an active buzzer with a confirm button. The caregiver sets dose schedules in the app; they sync to the ESP32 and persist in non-volatile memory. At each dose time the motor indexes the carousel (with startup position calibration to prevent drift) so the correct compartment aligns with the chute; the buzzer sounds

and the OLED shows the dose name/time until the user presses confirm. If no confirmation arrives within the configurable 30-minute grace window, the unit re-alerts and notifies the caregiver via the app (SMS option). Every dose event is timestamp-logged, feeding daily/weekly adherence percentages in the caregiver app's adherence ring.

Carousel indexing repeated reliably across hundreds of test cycles with startup calibration eliminating drift, and reminder-to-alert timing matched the configured grace window exactly. The live demo is crisp: a dose set one minute out indexes the carousel, sounds the reminder, and logs the confirmation — then a second dose deliberately ignored fires the missed-dose alert, showing the full adherence loop.

06 Technologies / Components Used

ESP32/Arduino · servo/stepper motor · rotating compartment carousel · buzzer · RTC module · OLED · app

07 Key Features

- 8-compartment carousel with calibrated motor indexing.
- Battery-backed RTC: schedules survive outages and work without WiFi.
- Persistent buzzer + OLED reminders until acknowledged.
- Missed-dose detection with caregiver app/SMS alerts.
- Caregiver app: schedules, adherence ring, alert configuration.
- Per-dose timestamp log for adherence reports.

08 Applications / Use Cases

- Elderly home care
- post-surgery medication regimes
- chronic-illness management
- assisted-living facilities
- as a platform for fingerprint-locked access or dose-verification extensions

10 Conclusion

This dispenser is a complete, examinable health-tech IoT system — from electromechanical dispensing to adherence analytics — with genuine real-world value and a tight, demonstrable results story the student can defend in the viva.