ESP2LIFE HACKATHON

REPORT

Team Lead and Roll Number:
Midhunan V   CB.SC.U4CSE23532

Team Members and Roll Numbers:
Nishanth S Gowda CB.SC.U4CSE23538
Varun Hirthik   CB.SC.U4CSE23567
Akshar Sakhi   CB.SC.U4CSE23547

Theme: Home Automation

Problem Statement:

Smart Medication Dispenser Many people, especially the elderly, struggle to manage their medication schedules. Develop a Smart Medication Dispenser that organizes and dispenses medication at scheduled times. The system can send reminders and alerts to users and caregivers, ensuring timely medication intake.

Detailed Description:

The Smart Medication Dispenser is designed to help individuals, especially the elderly, manage their medication schedules efficiently. It automates medication dispensing, ensures adherence, and provides comprehensive monitoring for patients, caregivers, and healthcare professionals.

Key Features:

1. Automated Medication Dispensing:

  - The dispenser releases medications at scheduled times as set by the healthcare provider. Multiple compartments allow for different medications, ensuring accurate and timely doses.

2. Refill Alerts and Notifications:

  - Sensors track medication levels in each compartment. When supplies are low, the system sends alerts to the patient, caregiver, and doctor, ensuring timely refills and preventing missed doses.

3. Compliance Monitoring with Weight Sensors:

  - A weight sensor in the dispensing box detects whether the medication has been removed. If the sensor indicates that the medication hasn't been taken, alerts are sent to the patient, caregiver, and doctor, helping monitor adherence.

4. Comprehensive Application for Monitoring and Management:

   Doctor Interface:

   - Allows doctors to remotely monitor patient adherence, view missed doses, and modify prescriptions. Notifications are sent to update the patient and caregiver about new or discontinued medications.

   -Patient and Caregiver Interface:

   - Provides a user-friendly app that shows medication schedules, upcoming dose alerts, and notifications about prescription changes. Includes features for refill alerts and instructions for adding new medications.

5. Shared Medication Management Feature

The Smart Medication Dispenser supports multiple user profiles, allowing different individuals, such as a couple, to share the same device. Each user has a separate profile with customized medication schedules and alert settings. The dispenser allocates specific ports for each user (e.g., Ports 1-4 for User A and Ports 5-8 for User B) and uses digital indicators to prevent confusion. The system sends personalized alerts and notifications, ensuring timely adherence for each user.

6. Hospital Efficiency

In hospitals, the Smart Medication Dispenser can automate the distribution of medications, reducing the workload for nurses. By accurately dispensing and tracking patient medications, it minimizes the need for manual distribution, thereby allowing nurses to focus on more critical patient care tasks.

Required Hardware:

1) Microcontroller: ESP32-WROOM-32

2) Stepper Motors/Servo Motors: For dispensing mechanism.

3) Sensors: Load Cell with HX711 Module

4) Notification System: LEDs and buzzers.

5) Power Supply: AC to DC Adapter

6) Connectivity Modules: Wi-Fi/Bluetooth Module (integrated in ESP32)

7) Real-Time Clock (RTC) Module: DS3231

8) User Interface Components: Push Buttons

9) Additional Sensors (optional): Proximity Sensor, Temperature and Humidity Sensor

10) Backup Power: Small Battery Backup

Usage of Cloud platforms, AI models:

    I.   **Cloud Platforms:** [GCP- Google Cloud Platform]

      1. Centralized Data Management and Real-Time Syncing:

      - Store user profiles, medication schedules, and sensor data in the cloud for easy access and real-time updates across devices, ensuring accurate and timely information.

      2. Remote Monitoring and Automated Alerts:

      - Enable remote monitoring by healthcare providers and send automated alerts and notifications about medication schedules and adherence issues, improving patient care and compliance.

      3. Secure Storage and Scalability:

      Utilize cloud services for secure data storage with encryption and compliance with regulations, while also benefiting from scalable infrastructure to handle growing data and user needs.

    II.   **AI Models:**

      Use AI algorithms to optimize medication schedules based on patient habits, health conditions, and historical data. Adjust schedules dynamically in response to changes in the patient's health or medication needs.

Feasibility:

      "Health is wealth." The Smart Medication Dispenser is highly feasible and provides significant benefits, especially for the elderly and those with chronic conditions in India. It promotes medication adherence, reduces caregiver burdens, and offers valuable data to healthcare providers. Ideal for households, nursing homes, and hospitals, it enhances overall health management.

Budget:

Item		Cost
ESP32-WROOM-32	-->	₹500
Stepper Motors/Servo Motors	-->	₹350
Load Cell with HX711 Module	-->	₹135
LEDs and buzzers	-->	₹100
AC to DC Adapter	-->	₹150
Real-Time Clock Module DS3231	-->	₹135
Push Buttons	-->	₹50
Additional Sensors (optional)	-->	₹300
Battery	-->	₹500
Miscellaneous Expenses	-->	₹1000
Total	-->	₹3220

The overall budget for hardware and sensors for each Smart Medication Dispenser will be around ₹3,000 to ₹4,000.