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SMART MEDICINE DISPENSER USING IOT

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Abstract— ***Introducing a revolutionary solution to combat the widespread problem of medication forgetfulness, especially prevalent among individuals of all ages, notably impacting seniors grappling with memory challenges. This innovative smart medicine box is meticulously designed to offer a compact and cost-effective remedy. Boasting a user-friendly knob interface, users or caregivers can effortlessly set medication timings, thereby activating a timely alarm alert. Whether the medication is essential for medical conditions, cosmetic enhancements, or supplemental needs, this ingenious device serves as an unwavering ally, fostering consistent adherence to prescribed regimens amidst the chaos of modern-day lifestyles. It is made by using the Raspberry pi 3 along with the servo motors, 16*2 LCD display and LED's related to the output indication of the process.***

Keywords- Raspberry pi 3,Servo motor,LCD,LED

I. INTRODUCTION

In today's advancing healthcare landscape, an increasing number of diseases are being diagnosed and treated through various means such as surgery and medication. Medications are often prescribed post-surgery to maintain the body's immune response and address various health concerns ranging from vitamin deficiencies to chronic illnesses, genetic disorders, and the effects of old age. Individuals, both young and old, seek relief from symptoms like nausea, pain, and headaches through prescribed medication after consulting healthcare professionals.However, amidst the demands of daily life or other factors, patients sometimes forget to take their medication, exacerbating their conditions and impacting their quality of life. For instance, young children, prone to distraction, may forget to take their medication, leaving it up to parents who may also forget due to work or stress. The introduction of a smart medication box provides a solution, allowing parents to set alarms to remind their children to take medication even when they are not present.Similarly, adults and teenagers balancing work, studies, and other responsibilities can benefit from this device as a reminder to take their medication. While setting alarms on phones is an option, there's a risk of ignoring reminders amidst busy schedules. The portable nature of the smart med box ensures it can be carried anywhere, with the alarm prompting immediate medication intake. If ignored, a notification is sent to the designated guardian, ensuring adherence to medication schedules.This device is particularly invaluable for the elderly, who may experience memory decline due to age-related factors or conditions like Alzheimer's disease and Parkinson's disease. Missing even a single dose can result in significant discomfort, especially for those living alone or with limited caregiver support. The smart medicine box alleviates the burden on both the elderly and their caregivers by serving as a reliable reminder for medication intake.

II. METHODOLOGY

An external power source is essential for the device's operation, with the Raspberry Pi 3 Model B serving as its primary component. This device stores necessary data and medication-related code on a small SD card. Connected to the medicine boxes are four servo motors and LEDs, enhancing user interaction through external output sources such as speakers and an LCD display. Operating on programmed principles, the device signals medication times by automatically opening the medicine box, emitting an alarm sound, blinking LEDs, displaying medication information on the LCD, and vocalizing instructions through speakers. Programming flexibility allows users to choose any language according to their preferences and needs. Additionally, the software Real VNC is utilized for Raspberry Pi functioning and acts as the Wi-Fi module. A camera and panic button are also attached to the device. If the patient is unable to take medication, pressing the panic button triggers an alert message to the patient's guardian, containing the message "I AM IN DANGER" and capturing the patient's image. This proactive approach enables immediate action through a Telegram chatbot, allowing for swift intervention and resolution of potential issues.

III. COMPONENTS

A. RASPBERRY PI 3

The Raspberry Pi 3 is a compact single-board computer manufactured by the Raspberry Pi Foundation. It boasts a quad-core ARM Cortex-A53 processor, 1GB of RAM, and integrated Wi-Fi and Bluetooth connectivity. With HDMI

output, USB ports, GPIO pins, and a range of compatible accessories, it's widely used for diverse projects including DIY electronics, home automation, and small-scale servers. Its open-source nature and affordability have made it a favorite among hobbyists, educators, and professionals alike. The Raspberry Pi 3, featuring a quad-core Cortex-A53 processor, is touted as delivering significantly improved performance compared to its predecessor, the Raspberry Pi 1. Performance benchmarks indicate that the Raspberry Pi 3 is approximately 80% faster than the Raspberry Pi 2 when executing parallelized tasks. This enhanced processing power opens up new possibilities for users seeking to undertake more demanding projects and applications with their Raspberry Pi devices.

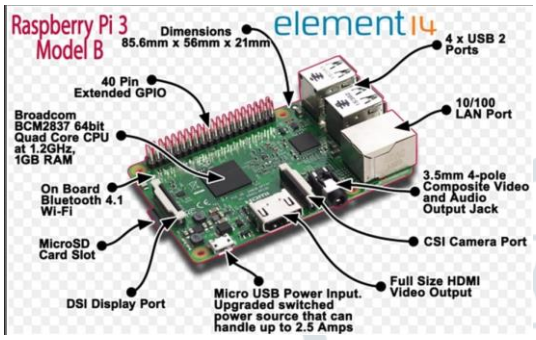

Fig 1: Raspberry pi 3

B. *LCD Display*

An LCD 16x2 (16 characters by 2 lines) is a common type of alphanumeric display module used in various electronic projects and devices. It consists of a liquid crystal display panel with 16 characters arranged in 2 rows, with each character typically composed of 5x8 dots. These modules also include a backlight for improved visibility in low-light conditions.

Fig 2: LCD Display

C. *Servo Motor*

A servo motor is a type of rotary actuator that enables precise control of angular position. It consists of a motor coupled with a feedback mechanism, typically a potentiometer, which provides information about the current position of the motor shaft. This feedback loop allows servo motors to accurately move to a desired position and maintain that position with minimal error.

Fig 3: Servo Motor

D. *Raspberry pi Cam*

The Raspberry Pi Camera Module is a compact camera accessory created to seamlessly integrate with Raspberry Pi single-board computers. It connects via the CSI (Camera Serial Interface) port, enabling users to effortlessly capture images and videos within their Raspberry Pi projects. This module offers flexibility and convenience for various applications, including surveillance, photography, video streaming, and more, making it a popular choice among hobbyists, educators, and professionals alike.

Fig 4: Raspberry pi Cam

E. *Speakers*

USB speakers are audio output devices that connect to a computer or other compatible device via a USB port. Unlike traditional speakers that require a separate power source and audio input connection, USB speakers draw power and audio signals directly from the USB port, simplifying setup and eliminating the need for additional cables.

Fig 5: Speakers

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F. *Buzzer*

A buzzer is an audio signaling device that produces a continuous or intermittent sound when an electrical current passes through it. It typically consists of an electromechanical transducer, such as a coil or piezoelectric element, housed in

a plastic or metal enclosure. When activated, the buzzer generates vibrations that create audible sound waves..

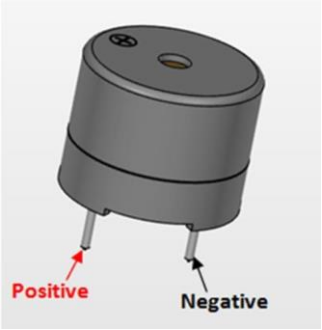

Fig 6: Buzzer

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G. LED's

LEDs, or Light Emitting Diodes, are semiconductor devices that emit light when an electric current passes through them. They are small, energy-efficient, and durable, making them widely used for various lighting application.

Fig 7: LED's

H. Panic Button Or Emergency Button

A panic or emergency button is a device designed to quickly and easily alert others in case of an urgent situation or emergency. It typically consists of a button or switch that, when pressed, triggers a pre-defined response or action, such as sounding an alarm, sending a notification to emergency contacts, or activating security measures.

Fig 8: Panic Button

I .Software Python Idle

Python stands out as the leading multi-purpose, high-level programming language in today's tech landscape. Its versatility enables programming in both Object-Oriented and Procedural paradigms, with Python code typically being more concise compared to languages like Java. This succinctness is owed partly to the language's indentation requirement, which ensures readability at all times

Fig 9: Python Idle Template

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J.Telegram App

Telegram Cloud is a storage service offered by the messaging platform Telegram. It enables users to securely store their messages, media files, and other data on Telegram's servers, accessible from any internet-connected device. With seamless synchronization across devices, users can access their messages and files from smartphones, tablets, and computers

Fig 10: Telegram App

K.SD Card

An SD card, or Secure Digital card, is a type of small, portable memory card commonly used to store digital data. It is widely utilized in various electronic devices such as digital cameras, smartphones, tablets, and portable gaming consoles.SD cards come in different physical sizes, including standard SD, miniSD, and microSD, with microSD being the most common size used in modern devices due to its compact form factor. They also vary in storage capacity, ranging from a few gigabytes to several terabytes.

Fig 11: SD Card

IV. BLOCK DIAGRAM FOR SMART MEDICINE DISPENSER USING IOT

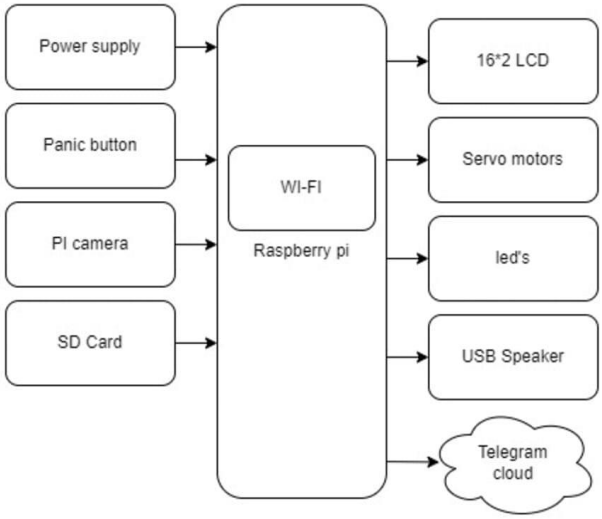

FIG12: Block diagram for Smart medicine dispenser using Iot

IV. WORKING

A smart medicine dispenser utilizing IoT (Internet of Things) technology operates by leveraging connected devices and sensors to ensure accurate and timely medication administration. Here's how it typically works:

1. Medication Schedule Setup: Users input their medication schedule into a companion mobile app or web interface. This includes details such as medication names, dosages, frequencies, and specific times for administration.

2. Dispenser Monitoring: The smart dispenser is equipped with sensors to detect medication levels and track usage. These sensors can monitor factors like pill count, liquid volume, or the weight of medication containers.

3. Connectivity: The dispenser is connected to the internet via Wi-Fi or other communication protocols, allowing it to communicate with the user's smartphone or a central server.

4. Real-time Monitoring and Alerts: The smart dispenser continuously monitors medication levels and adherence to the prescribed schedule. If a dose is missed or medication levels are low, the system sends alerts and notifications to the user's smartphone or designated caregivers.

5. Refill Reminders: When medication levels run low, the smart dispenser can automatically generate refill reminders or even place orders for prescription refills from pharmacies, ensuring that the user never runs out of medication.

6. User Interface: The dispenser may feature a user-friendly interface such as an LED display or buttons for manual interaction. This allows users to access medication information, acknowledge reminders, or trigger manual dispensing if needed.

7. Data Analytics and Reporting: The system collects and analyzes data on medication adherence, usage patterns, and refill history. This information can be used to generate reports for healthcare providers or caregivers, facilitating better management of the user's health.

8. Security and Privacy: To protect sensitive medical information, the smart dispenser employs encryption and secure authentication mechanisms to ensure data privacy and prevent unauthorized access.

Overall, a smart medicine dispenser using IoT technology provides a convenient and reliable solution for managing medication adherence, enhancing patient safety, and improving health outcomes.

V. RESULT

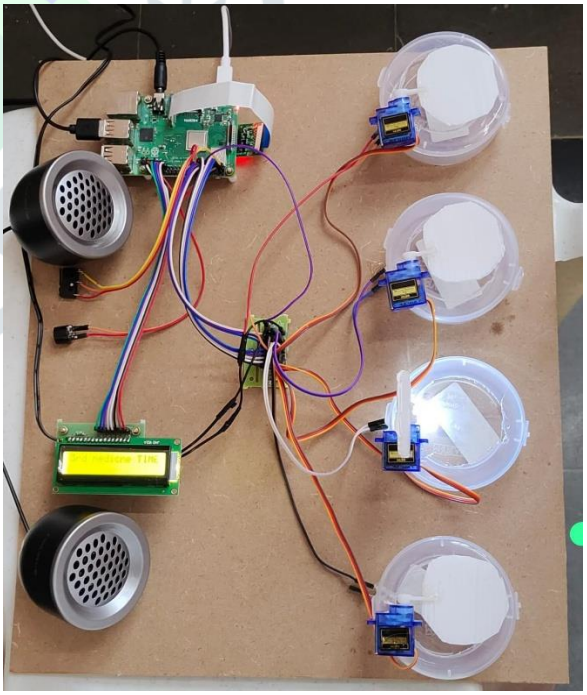

FIG 13: Hardware Unit

The Figure 13 shows the Hardware unit and connections to the raspberry pi module.

VI. CONCLUSION

The project was undertaken to address the common issue of people, both young and old, often forgetting to take their medication due to the demands of their daily lives. It aims to provide a practical solution that can benefit caretakers, guardians, and patients by relieving them of the constant burden of remembering medication schedules. The project offers an inexpensive, easy-to-use, and portable solution. Further enhancements could involve expanding the menu options, incorporating sensors to track pill usage, increasing compartment capacity, and implementing security measures.

VII. ACKNOWLEDGMENT

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