IJAREEIE

e-ISSN: 2278-8875
p-ISSN: 2320-3765

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

Volume 13, Issue 4, April 2024

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.317

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering (IJAREEIE)

| e-ISSN: 2278 – 8875, p-ISSN: 2320 – 3765| www.ijareeie.com | Impact Factor: 8.317|| A Monthly Peer Reviewed & Referred Journal |

||Volume 13, Issue 4, April 2024||

| DOI:10.15662/IJAREEIE.2024.1304036 |

IOT based Smart Medicine Box

Dileep V Raju, Keerthi A Pai, Pavan N, Yadukumari, Raghavendra M

UG Students, Dept. of ECE, NIEIT, Mysuru, Karnataka, India

Assistant Professor, Dept. of ECE, NIEIT, Mysuru, Karnataka, India

ABSTRACT: The Medicine Dispenser with Health Monitoring System represents a revolutionary approach to medication management, particularly tailored to meet the needs of patients requiring regular and timely doses. The integration of advanced technologies, such as the Node MCU and Blynk, enables seamless communication and control. While a buzzer alerts patients at designated times, A servo motor facilitates easy access by opening the dispenser cap, and a health monitoring system captures vital signs, including heartbeat, SpO2, and temperature, transmitting this data to the Blynk cloud. Moreover, an ultrasonic sensor enhances accessibility for visually impaired users by guiding them to the dispenser through sound cues.

KEYWORDS: Health Monitoring System, Node MCU, Blynk cloud, Heartbeat and Spo2.

I.INTRODUCTION

The IoT-based Smart Medicine Box is an innovative project designed to revolutionize medication management and adherence through the integration of advanced technologies. Utilizing the power of the Internet of Things (IoT) and the computational capabilities of the Node MCU, the system features a compact and intelligent device that goes beyond traditional pill organizers. The Smart Medicine Box employs a servo motor for precise medication dispensing, an ultrasonic sensor for user proximity detection, and a heartbeat sensor for health monitoring. The user interface is enriched through the integration of a Bylnk application, allowing for remote monitoring and control. Auditory feedback is facilitated by a speaker and buzzer, providing timely medication reminders and system status alerts. The project's versatility is underscored by the potential for future enhancements, including cloud integration for data analytics, machine learning for predictive adherence, and user behavior analysis. The Smart Medicine Box represents a promising step towards personalized and connected healthcare, addressing the complexities of medication adherence and paving the way for the future of intelligent healthcare systems.

The Smart Medicine Box project leverages the capabilities of the Node MCU to create an intelligent and automated solution for medication management. By integrating sensors, connectivity, and a user-friendly interface, the system ensures timely and accurate medication adherence. The Node MCU serves as the central processing unit, coordinating various functionalities a motorized mechanism for dispensing the correct dosage, and connectivity options (like Wi-Fi or Bluetooth) for real-time communication with a mobile app or cloud- based platform. The Smart Medicine Box not only helps patients adhere to their medication schedules but also provides caregivers and healthcare providers with valuable insights into patient compliance through data analytics, fostering a more efficient.

II.SYSTEM MODEL AND ASSUMPTIONS

The proposed system is a holistic approach to medication management, combining cutting-edge technologies and userfriendly design. The Node MCU serves as the central intelligence, enabling seamless communication with the telegram bot. This connectivity allows for remote monitoring, ensuring that patients' medication adherence can be tracked and adjusted as needed. This adds precision to medication schedules, eliminating the guesswork associated with traditional methods. A buzzer acts as an audible reminder, alerting patients when it's time to take their medication. The inclusion of a servo motor enhances accessibility by automating the process of opening the dispenser cap. This feature not only simplifies the user experience but also addresses potential issues for patients with limited dexterity or mobility. The health monitoring system is a groundbreaking addition, capturing vital parameters such as heartbeat, SpO2.
The problem statement delves into the limitations and challenges of existing medication management systems. Conventional methods often rely on manual intervention, leaving room for human error and forgetfulness. These

| e-ISSN: 2278 – 8875, p-ISSN: 2320 – 3765| www.ijareeie.com | Impact Factor: 8.317|| A Monthly Peer Reviewed & Referred Journal |

||Volume 13, Issue 4, April 2024||

| DOI:10.15662/IJAREEIE.2024.1304036 |

systems lack the sophistication needed for patients with specific requirements, leading to potential health risks. This project addresses these challenges head-on, providing an automated and intelligent solution that ensures medication.

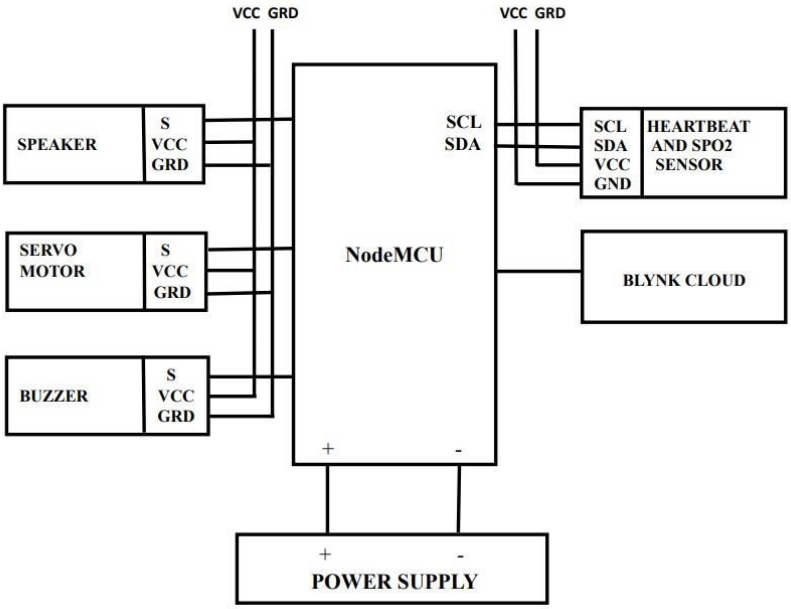


Fig. 1 System Model

A buzzer acts as an audible reminder, alerting patients when it's time to take their medication. The inclusion of a servo motor enhances accessibility by automating the process of opening the dispenser cap. This feature not only simplifies the user experience but also addresses potential issues for patients with limited dexterity or mobility. The health monitoring system is a groundbreaking addition, capturing vital parameters such as heartbeat, SpO2, and temperature. The ultrasonic sensor adds an innovative touch to the project by enhancing accessibility for visually impaired individuals. By detecting the proximity of a person, the sensor triggers the buzzer, guiding the individual to the dispenser. Once the person reaches the dispenser, the buzzer is turned off, ensuring a seamless and user-friendly experience.

The IoT-based Smart Medicine Box involves the seamless integration of various components to create an intelligent and user-friendly medication management system. At the core of the system is the Node MCU, serving as the central processing unit. The system employs an Ultrasonic Sensor for proximity detection, enabling the Smart Medicine Box to detect the presence of the user when approaching.

The Node MCU communicates with a Blynk cloud through an internet connection, providing a user-friendly interface for remote monitoring and control. The Blynk cloud allows users and caregivers to receive notifications, reminders, and updates regarding medication schedules and adherence. Servo Motor is incorporated to actuate the dispensing mechanism, ensuring precise and controlled release of medications. The Buzzer and Speaker serve as auditory indicators for various system states, such as medication dispensing or system errors.

To enhance the system's capabilities, a Heartbeat Sensor may be integrated to monitor the user's health status. This data can be relayed to healthcare professionals or caregivers for real-time health monitoring. Finally, the entire system is powered by a reliable power supply, ensuring continuous operation.

III.METHODOLOGY

System Initialization: The flowchart commences with the system initialization phase, where the Node MCU initializes connections, sensors, and sets up communication channels. This includes establishing Wi-Fi or other connectivity

| e-ISSN: 2278 – 8875, p-ISSN: 2320 – 3765| www.ijareeie.com | Impact Factor: 8.317|| A Monthly Peer Reviewed & Referred Journal |

||Volume 13, Issue 4, April 2024||

| DOI:10.15662/IJAREEIE.2024.1304036 |

options to enable communication with external devices and services. The Ultrasonic Sensor comes into play, detecting the user's proximity to the Smart Medicine Box. This information is crucial for triggering the system to await user input and engagement.

Medication Schedule Retrieval: The system retrieves the user's medication schedule.This information is crucial for the subsequent steps in the process, guiding the system on when and what medication to dispense. Simultaneously, the system establishes communication with the Blynk application. This feature enables remote monitoring and control, allowing users or caregivers to receive notifications, update medication schedules, and interact with the Smart Medicine Box through a user-friendly interface. With the medication schedule in hand, the system activates the servo motor to disense the prescribed medication. The motorized mechanism ensures precise and controlled dosage delivery.

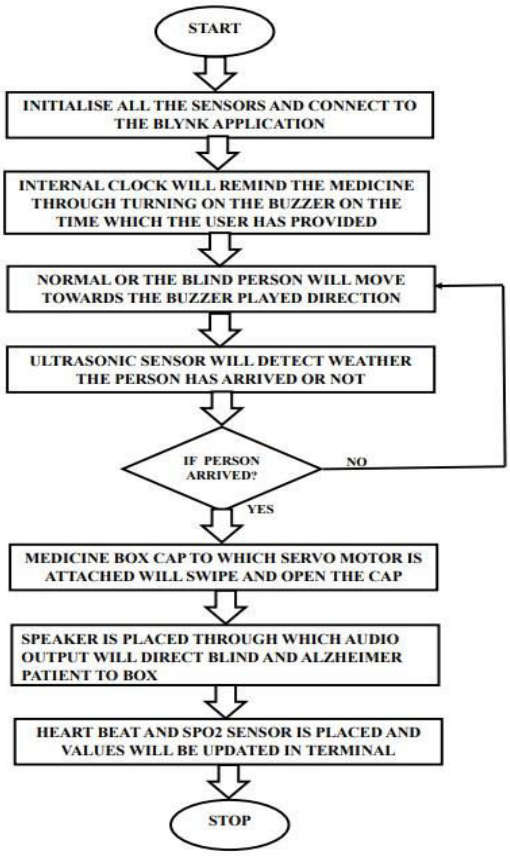


Fig. 2 Flow Chart

Auditory and Visual Alerts: During and after the dispensing process, the flowchart includes steps for auditory alerts using the speaker and buzzer. These alerts serve to notify the user about the ongoing process, providing feedback.

Health Monitoring with Heartbeat Sensor: Optionally, the flowchart incorporates steps for health monitoring using the heartbeat sensor. This sensor can measure the user's heart rate, providing valuable health data that can be communicated to healthcare providers or caregivers. With the medication schedule in hand, the system activates the servo motor to dispense the prescribed medication. The Bynk application simultaneously giving updates to the caretaker is a necessity.

IV.SURVEY DESCRIPTION

A literature survey on smart medicine boxes reveals an evolving landscape in healthcare technology, designed to improve medication adherence and patient care. These smart medicine boxes, equipped with various sensors and connectivity features, address the critical issue of medication non-compliance, which can have significant consequences on patient health and healthcare costs. Researchers and innovators are exploring various aspects of smart medicine boxes, including design, functionality, and their impact on patient outcomes.

| e-ISSN: 2278 – 8875, p-ISSN: 2320 – 3765| www.ijareeie.com | Impact Factor: 8.317|| A Monthly Peer Reviewed & Referred Journal |

||Volume 13, Issue 4, April 2024||

| DOI:10.15662/IJAREEIE.2024.1304036 |

The survey highlights the importance of smart medicine boxes as a part of the broader concept of Internet of Things (IoT) in healthcare. IoT-enabled medicine boxes provide real-time medication tracking, dosage reminders, and even the ability to transmit data to healthcare providers. Studies have demonstrated that these technologies can significantly enhance medication adherence rates, particularly for patients with chronic conditions. Additionally, smart medicine boxes can improve medication management for the elderly, who often struggle with complex medication regimens.
Various connectivity options, such as Bluetooth and mobile apps, are being integrated into these devices to ensure seamless communication between patients and healthcare. Artificial intelligence (AI) and machine learning algorithms can be employed to analyze this data and offer tailored recommendations to patients, further enhancing their overall health outcomes. The research in this area continues to explore how smart medicine boxes can be integrated into the larger healthcare ecosystem, with a focus on interoperability and data security to protect patients' sensitive health information.

V.FUTURE SCOPE AND DISCUSSION

Machine Learning for Predictive Adherence: Incorporate machine learning algorithms to analyze user adherence patterns and predict potential deviations from medication schedules. This predictive capability can provide proactive interventions, personalized reminders, and recommendations to improve overall adherence.
Expandable Medication Database: Develop a mechanism for easily expanding and updating the medication database. This could involve incorporating machine-readable codes (such as QR codes) on medication packaging, enabling automatic identification and entry into the system. Continued research and development in these areas will contribute to the evolution of the IoT- based Smart Medicine Box, making it a more sophisticated and impactful solution.

VI.CONCLUSION

In conclusion, the IoT-based Smart Medicine Box project represents a significant stride towards revolutionizing medication management through the integration of cutting-edge technologies. By leveraging the power of the Internet of Things (IoT) and the computational capabilities of the Node MCU, this project offers a comprehensive solution to address the complexities of medication adherence. The seamless coordination of components such as the servo motor, ultrasonic sensor, heartbeat sensor, buzzer, and speaker results in an intelligent system that not only dispenses medications accurately but also communicates effectively with users. As we move forward, the IoT-based Smart Medicine Box project exemplifies the convergence of healthcare and technology, emphasizing the importance of innovative solutions in enhancing patient well-being.

REFERENCES

[1] Smart Pill Box with Remind and Consumption Confirmation Functions Huai-Kuei Wu1 Member, A IEEE, Chi-Ming Wong2 , Pang-Hsing Liu1 , Sheng-Po Peng1 , Xun-Cong Wang1, Chih-Hi Lin1 and Kuan-Hui Tu1, IEEE 4th Global Conference on Consumer Electronics (GCCE), 2022.
[2] H.-L. Tsai, C. Tseng, L. Wang and F.-S. Juang, "Bidirectional smart pill box monitored through internet and receiving reminding message from remote relatives," in IEEE International Conference on Consumer Electronics - Taiwan (ICCE-TW), Taipei, Taiwan, 2021.
[3] S. Sohn, M. Bae, D.-K. Lee and H. Kim, "Alarm system for elder patients medication with IoT-enabled pill bottle," in International Conference on Information and Communication Technology Convergence (ICTC), Jeju, South Korea, 2019.
[4] Al-Shammary R, Mousa D, Esmaeili S E, “The Design of a Smart Medicine Box,” Electrical Engineering (ICEE), pp. 130-134, 2018.
[5] Bharadwaj S A, Yarravarapu D, Reddy S C K, et al, “Enhancing healthcare using m-Care box,” International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud), pp. 352-356, 2018.
[6] Design & Implementation of an Automated Reminder Medicine Box for Old People and Hospital Mohammed Abdul Kader Dept. of EEE International Islamic University Chittagong (IIUC) Mohammad Nayim Uddin, 2nd Int. Conf. on Innovations in Science, Engineering and Technology (ICISET), Chittagong, Bangladesh, 2018.
[7] Research and Implementation of an Intelligent Medicine Box ;Ben-bin Chen, Yu-hao Ma, Jia-Liang Xu, International Conference on Intelligent Green Building and Smart Grid (IGBSG2019), Yichang, 2017.

| e-ISSN: 2278 – 8875, p-ISSN: 2320 – 3765| www.ijareeie.com | Impact Factor: 8.317|| A Monthly Peer Reviewed & Referred Journal |

||Volume 13, Issue 4, April 2024||

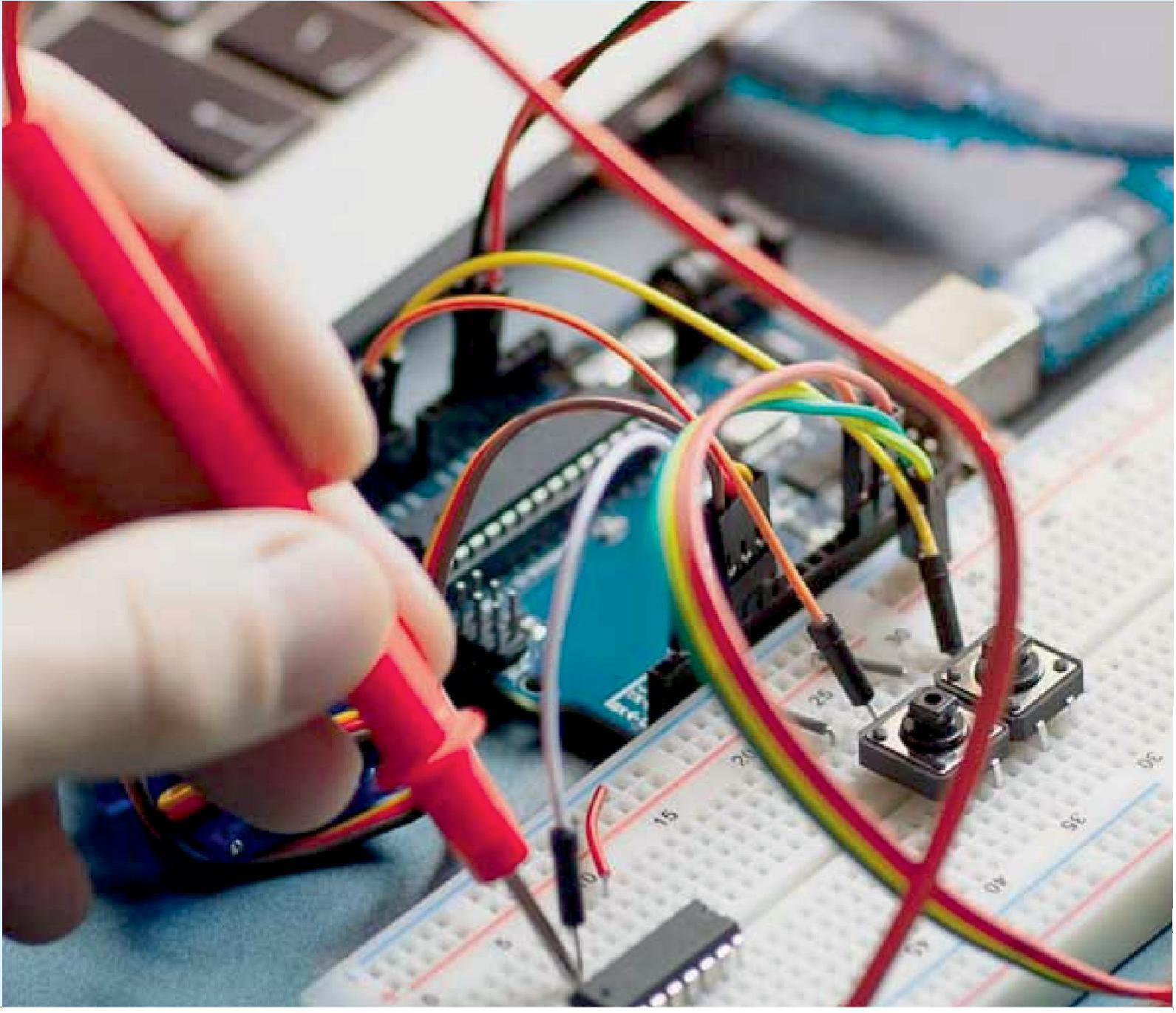
| DOI:10.15662/IJAREEIE.2024.1304036 |

[8] A. Bharadwaj, D. Yarravarapu, S. Reddy, T. Prudhvi, K. Sandeep and O. Reddy, "Enhancing healthcare using mcare box (monitoring non-compliance of medication)," in International Conference on Innovative Mechanisms for Industry Applications (ICIMIA), Bangalore, India, 2017.

[9] Y. Cha, K. Nam and D. Kim, "Patient Posture Monitoring System Based on Flexible Sensors," Sensors, vol. 17, no. 3, pp. 1-9, 2017.

[10] R. Ransing and M. Rajput, "Smart home for elderly care, based on Wireless Sensor Network," in International Conference on Nascent Technologies in the Engineering Field (ICNTE), Navi Mumbai, Indi, 2015.

.



INNO SPACE
SJIF Scientific Journal Impact Factor

doi cross ref

ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

निस्केयर NISCAIR

International Journal of Advanced Research

in Electrical, Electronics and Instrumentation Engineering

9940 572 462 6381 907 438 ijareeie@gmail.com

Scan to save the contact details