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IOT Based Voice Medicine Box using ESP8266

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ABSTRACT: Multiple surveys indicate that about 65% of adults are elderly people and are suffering from chronic diseases like diabetes, cholesterol, arthritis, osteoporosis, dementia, blindness, Alzheimer and so on. Also, the youngsters have fallen prey to the busy and hectic lifestyle. This busy lifestyle has made them forget to take their medicines on time, which is essential for their healthy recovery from their diseases. Our project's main aim is to make a Smart medicine box for those users who regularly take medicines and the prescription of their medicine is very long as it is hard to remember to patients and also for their care giver. This medicine box will be designed with 2 trays for morning and night time of the day. Medicines will be preloaded in the trays as per the prescription by the doctor. Using ESP8266 as a controller, we can monitor the medicine box tray opening and closing at exact time provided by RTC. Also, using Voice module, the audio announcement will be given following name, spelling and color of the particular medicine in 3 different regional languages i.e., Marathi, Hindi and English to remind the people to take the medicine. Also, the whole system will be monitored using Android application. This project presents a Voice-Controlled Smart Medicine Box system using Node MCU (ESP8266), aimed at assisting patients especially the elderly or visually impaired in managing their medication schedules efficiently and independently. The system integrates a voice recognition module to accept voice commands, enabling users to access their medicines without manual operation. A DC gear motor, controlled by an L298 motor driver IC, automates the opening and closing of specific medicine compartments based on voice input. A 16x2 LCD display shows relevant information such as medicine names, timings, and status. The system connects to the internet via Node MCU, allowing real-time synchronization with a web application and an Android app. These interfaces provide functionalities such as remote medicine schedule setup, dose reminders, notifications, and compliance tracking by caregivers or doctors. This smart medicine box enhances patient compliance, ensures timely medication intake, and offers a hands-free experience through IoT, automation, and voice control technologies. It is especially beneficial in healthcare monitoring and remote patient management, supporting the vision of smart and accessible healthcare solutions.

KEYWORDS: - Node MCU, LCD16x2, Voice Module, Android App and Web Application

I. INTRODUCTION

In day-to-day life most of the people need to take medicines which was not there in past couple of years and the reason behind this is diseases are increasing in large amount. So sooner or later many people come in contact with these diseases. Some diseases are temporary diseases while many are permanent life-threatening diseases. We need to be in advice of doctor who tells us to take desired pills in desired way so that patients face problems like forgetting pills to take at right time and also when Doctor changes the prescription of medicine patients have to remember the new schedule of medicine. This problem of forgetting to take pills at right time, taking wrong medicines and accidentally taking of expired medicine causes health issues of patient and this leads to suffer from unhealthy life. To ensure health safety, we will develop a medicine box signed with 2 portable trays, one tray for one time of the day i.e., morning and night time. Using controller and Wi-Fi technology, the trays will be opened on exact time as set by user and will be closed after provided time delay. At the time of tray opening, we will be providing a Voice module which will announce audio of the medicine prescription in 3 regional languages such as English, Hindi and Marathi because not everyone understands English language following Spelling, Name and color of the medicine. Also, using LCD, spelling as well as color of the particular medicine will be displayed on it. As everyone is well known with colors, it will be advantageous by audio announcement even if anyone is illiterate and unable to get the exact medicine. The medicine box will remind the people to take medicines on time. The whole system will be monitored and controlled using android application through Wi-Fi with dynamic time setting so that user can set time as per need. In android



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application, there will be timers for time setting of each tray. User can set time of tray opening and closing as per their need. The Voice-Controlled Medicine Box offers a smart, user-friendly solution that combines IoT and automation for efficient medicine management. At the heart of the system is the Node MCU (ESP8266), which connects the device to the internet and enables real-time communication with both a web application and an Android app. The user interacts with the system through a voice recognition module, which processes spoken commands to dispense medicine. A DC gear motor, driven by the L298 motor driver IC, controls the mechanical movement of the box, while a 16x2 LCD displays essential information such as medicine names, timings, and alerts. Through remote scheduling, voice-controlled dispensing, and real-time monitoring, this system enhances medication adherence, offers hands-free operation, and contributes to safer, smarter healthcare management at home.

II.LITERATURE REVIEW

1. In the paper titled “Bidirectional Smart Pill Box Monitored through Internet and Receiving Reminding Message from Remote Relatives”, authors Hsiu-Ling Tsai, Chun Hsiang Tseng in author introduced the recently developed applications feature integrated individual sensors as part of a sensor network, which relies on modern wireless communication technology. They work by transmitting data from the sensor network to a personal computer or mobile phone. An assistive device, smart pill boxes (SPB) such as Tricella, Pilldrill, Medfoliopillbox, E-Pill-Multiplus, and E-Pill-Medsmartplus, which allow family members of the elderly to monitor whether medication has been taken or not to ensure effective health maintenance. Some of the smart pill boxes are just reminding or monitoring devices without any interaction between the elder person and his/her family. Our interactive SPB not only detects (forwards to webpage) that the elder person is taking the pills but also receives a remind message backwards to the LCD on SPB by displaying words and/or patterns, or speaking a voice to the users.

2. In the paper titled “IJSTE - International Journal of Science Technology Engineering Smart Medicine Reminder Box”, authors Sanjay Bhati, Harshid Soni, Vijayrajsinh Zala, Parth Vyas, Mr. Yash Sharma authors conclude that our project's main aim is to make a Smart medicine box for those users who regularly take medicines and the prescription of their medicine is very long as it is hard to remember to patients and also for their care giver. Also Old age patients suffer from problems of forget to take pills on proper time which causes certain health issues for patients having Permanent diseases like diabetes, blood pressure, breathing problem, heart problems, cancer diseases etc. We saw these problems in hospitals people around us who have such kind of diseases and thus based on these two problems we made smart medicine box which solve these problems by Setting up time table of prescribed medicines through push buttons as given in prescription. Present time will be saved in RTC module and notification time will be saved in EEPROM. Therefore at the time of taking medicine system generate Notification sound and display the Bright light in certain pill boxes. So, 13 patient can know the specific number of box from which he has to take out medicines. All pill boxes are pre-loaded in the system which patient needs to take at given time. And our system has quality that it can sense if the patient had taken out pills from the box or not. Another advantage of our system includes of Sensing capability if the patient tries to postpone the time of taking medicine by suddenly opening and closing the medicine boxes to stop the sound. Compare to other devices available in market are capable to generate sound at one time and afterwards it stops. Thus, final result of our system provides fast curing of patient health by using our advantageous system.

3. In the paper titled “IoT Based Smart Medicine Box for Elderly People authors P. S. Khandare, S. A. Ladhane authors introduced have MediSmart is a special Med Box that also helps patients with visually handicap, like blind or ocular impaired and even partially deaf people. It uses both visual and audio aids to guide the patients. It also uses an LCD display to indicate the name of the prescribed tablets to be taken. Taking medicines is one of the important aspects for maintaining good health and thus MediSmart also provides a feature that notifies the patient via the app that the medicine box is empty and needs to be refilled so that they can take their medicines on time without any delay. This paper proposed a smart medicine box using IoT, capable of alerting patients about their medication time using a mobile app and buzzer system. The study explored the use of voice commands for controlling home appliances via a voice recognition module. The techniques used for processing commands directly influenced the design of voice-controlled medicine dispensing systems. This project automated pill dispensing based on time and quantity using DC motors and microcontrollers. The system lacked IoT features, but it provided useful insight into mechanical operation using L298 motor driver and DC gear motors.

4. In the paper titled” A Health-IoT Platform Based on the Integration of Intelligent Packaging, Unobtrusive Bio-Sensor, and Intelligent Medicine Box Geng Yang, Li Xie, Matti M“antysalo, Xiaolin Zhou, Member, IEEE, Zhibo



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Pang, Li Da Xu, Senior Member, IEEE, Sharon Kao-Walter, Qiang Chen, and Li-Rong Zheng, Senior Member, IEEE” authors conclude that The viability of the Health-IoT platform has been proved by conducting a series of in-field tests, involving bio-sensing, data retrieval, medication reminder and alarm, and multi standard communication capability test. However, limitations still exist in the implemented system. For instance, the implemented remote physician is mainly based on short messages, phone calls, or simple notices on the medicine box GUI. A user-friendly and interactive multimedia interface is desirable for a better user experience. Future work will comprise further enhancing Bio- Patch’s mechanical and electrical reliabilities by laminating a thin plastic insulation layer over the patch to protect the conductive traces. Enriching the medicine box GUI with more user- friendly functions and exploring new application scenarios for this Health-IoT platform are also open issues to work on.

No.	Paper Title	Author Name	Key Points
1	Bidirectional Smart Pill Box Monitored through Internet and Receiving Reminding Message from Remote Relatives	Hsiu-Ling Tsai, Chun Hsiang Tseng	They work by transmitting data from the sensor network to a personal computer or mobile phone. An assistive device, smart pill boxes (SPB) such as Tricella, Pilldrill, Medfoliopillbox, E-Pill-Multiplus, and E-Pill-Medsmartplus, which allow family members of the elderly to monitor whether medication has been taken or not to ensure effective health maintenance. Some of the smart pill boxes are just reminding or monitoring devices without any interaction between the elder person and his/her family. Our interactive SPB not only detects (forwards to webpage) that the elder person is taking the pills but also receives a remind message backwards to the LCD on SPB by displaying words and/or patterns, or speaking a voice to the users.
2	Smart Medicine Reminder Box	Sanjay Bhati, Harshid Soni, Vijayrajsinh Zala, Parth Vyas, Mr. Yash Sharma	Smart medicine box for those users who regularly take medicines and the prescription of their medicine is very long as it is hard to remember to patients and also for their care giver. Also Old age patients suffer from problems of forget to take pills on proper time which causes certain health issues for patients having Permanent diseases like diabetes, blood pressure, breathing problem, heart problems, cancer diseases etc. We saw these problems in hospitals people around us who have such kind of diseases and thus based on these two problems we made smart medicine box which solve these problems by Setting up time table of prescribed medicines through push buttons as given in prescription. Present time will be saved in RTC module and notification time will be saved in EEPROM. Therefore at the time of taking medicine system generate Notification sound and display the Bright light in certain pill boxes.
3	IoT Based Smart Medicine Box for Elderly People	P. S. Khandare, S. A. Ladhane	MediSmart is a special Med Box that also helps patients with visually handicap, like blind or ocular impaired and even partially deaf people. It uses both visual and audio aids to guide the patients. It also uses an LCD display to indicate the name of the prescribed tablets to be taken. Taking medicines is one of the important aspects for maintaining good health and thus MediSmart also provides a feature that notifies the patient via the app that the medicine box is empty and needs to be refilled so that they can take their medicines on time without any delay.
4	A Health-IoT Platform Based on the Integration of Intelligent Packaging, Unobtrusive Bio-Sensor, and	Geng Yang, Li Xie, Matti M’antysalo, Xiaolin Zhou	Health-IoT platform has been proved by conducting a series of in-field tests, involving bio-sensing, data retrieval, medication reminder and alarm, and multi standard communication capability test. However, limitations still exist in the implemented system. For instance, the implemented remote physician is mainly based on short messages, phone calls, or simple notices on the medicine box GUI. A user-friendly and interactive multimedia interface is



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	Intelligent Medicine Box		desirable for a better user experience. Future work will comprise further enhancing Bio- Patch's mechanical and electrical reliabilities by laminating a thin plastic insulation layer over the patch to protect the conductive traces. Enriching the medicine box GUI with more user- friendly functions and exploring new application scenarios for this Health-IoT platform are also open issues to work on.
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III. METHODOLOGY OF PROPOSED SURVEY

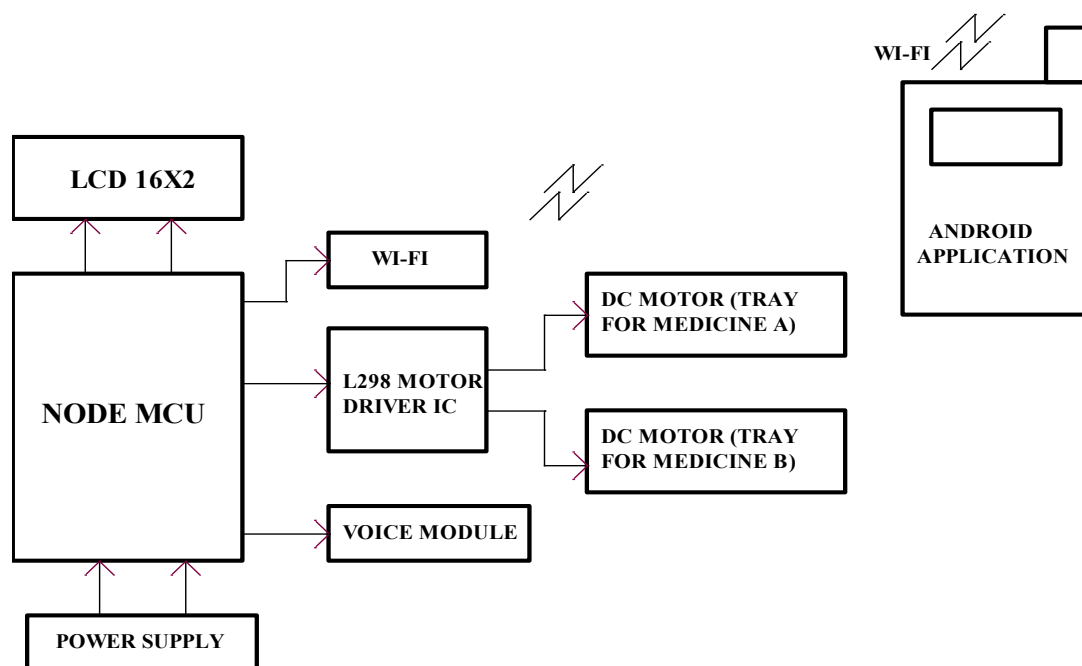


Fig 1: A Complete system design

Voice Interactive medicine Box comprises of 2 portable trays each for one time of the day. i.e., morning and night time. Node MCU is provided with 12V DC supply. At morning time, as per the set time, Tray 1 will be opened and at the same time, there will be audio announcement in regional languages following the medicine name and color. On LCD, the spelling and name of the medicine will be displayed. After taking medicine from the day, the tray be closed automatically. The whole operation of the medicine trays will be controlled and monitored using Android app. Application will be provided with timers on which user can set the particular time as per their need. This system ensures the health safety by taking medicines on time. The system begins with the voice recognition module, which captures the user's voice commands to identify the required medicine. These commands are processed by the Node MCU, which then sends control signals to the L298 motor driver IC. The L298 IC drives the DC gear motor, which is responsible for physically moving or rotating the appropriate medicine compartment to dispense the correct dosage. A 16x2 LCD display is used to show information such as the recognized command, medicine name, or system status, assisting the user in confirming the action. The Node MCU also connects to the internet via Wi-Fi, enabling real-time communication with an Android application and a web application. These interfaces allow remote scheduling of medicine doses, monitoring of adherence, and sending of notifications or reminders to the patient or caregiver. The integration of voice control, automation, and IoT connectivity provides a reliable and user-friendly solution for medication management, especially benefiting the elderly and visually impaired.



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IV.CONCLUSION AND FUTURE WORK

In conclusion, the Voice-Controlled Medicine Box presents an innovative and practical solution for improving medication management, particularly for elderly and visually impaired individuals. By integrating Node MCU, voice recognition, and IoT technology, the system enables hands-free medicine dispensing based on voice commands. The use of the L298 motor driver IC and DC gear motor allows for accurate mechanical control of medicine compartments, while the 16x2 LCD display provides clear feedback to the user. The inclusion of a web application and Android app enables remote scheduling, monitoring, and real-time notifications, making it easier for caregivers and family members to ensure proper adherence to medication routines. This system enhances healthcare accessibility, reduces dependency on others, and supports the broader goal of developing smart, connected healthcare devices for home-based patient support. We have successfully studied interfacing of Voice module with ESP8266. Also, we studied the power supply design of 5V required for the project. The interfacing of LCD with is studied which will be used to display the operation of the system. The goal of our project is to provide healthy and tension free life to those users who are taking regularly pills and to provide this product at affordable cost also. Our project is also reusable by exchanging those other medicine box that has only alerting system and are non-usable or unaffordable compare to our product.

In the future, we hope that the application can be to linked to med karts, if the tablets are empty, it directly sends a prescription message to the med kart in which they can help us delivering the prescribed tablets to our door step. Scanning of prescription to load the app can be done using image processing technology.

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