Medicine Alert Box for Alzheimer Patient

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Abstract -**This Internet of Things (IoT) is a concept that has revolutionized the way we live. IOT results in improvements in society's day-to-day operations. IoT has a lot of applications in healthcare. Advantages, such as the ability to monitor one's health in real-time, improve life quality and comfort, among other things, a type of Internet of Things. A smart medicine box is an example of an application in this domain. Provides users with medication treatment monitoring. It enables health professionals to ensure that users are adhering to their treatment regimens and aids in decision-making. The Alzheimer's disease (AD) is difficult to treat and has no known cure. Because of this condition, they frequently forget things and have challenging times. We can lessen Alzheimer's disease by monitoring affected people through the Internet of Things. The major objective is to make those who are afflicted need medication at the appropriate time without aid from others. It serves largely as a tool for the patient's medication instrumentality. The majority of smart medicine box projects in the literature are still expensive and do not address some IoT system characteristics such as scalability, latency, and time to respond, to name a few.**

Keywords — **Alzheimer, Medicine, Smart box, Healthcare**

I. INTRODUCTION

Our country has seen a trend of huge old populations, rapid growth, aging, disability, and empty-nesting since it became an aging society, and the problem of elderly care has become increasingly critical. According to statistics, the elderly has a high prevalence of difficulties such as forgetting to take medicine, taking medicine many times, or taking the wrong medicine, all of which pose major health risks. In response to these issues, a smart reminder medicine box with the ability to be divided has been devised to help address the problem and reduce the dangers of the elderly taking medicine.

Those in charge of a patient's or elder's medication must sort vast quantities of tablets each day, which leads to many medical errors. This project focuses on the ideation, design, and development of a prototype pillbox that intends to fill this gap in the medical industry by automatically sorting pills and providing a range of additional cutting-edge features, with the device being used in hospitals or nursing homes. This prescription pill box is intended for elderly caretakers as well as patients who regularly take prescriptions or vitamin supplements such as Alzheimer patients.

Alzheimer's disease is a degenerative illness in which the loss of memory cells results in a gradual decline in mental capacity, including remembering, thinking, and reasoning. An Alzheimer's patient experiences many challenges, such as short-term memory loss, hostility, loss of communication skills, repetitive behaviour, anxiety, agitation, and more.

The advancement of sophisticated technologies has arrived, allowing present technology to adapt to the challenges of the globe. Every year, the birth rate exceeds the mortality rate, resulting in population suffocation in every country. At the same time, demand for resources and basic necessities had increased in every country. Every living organism on the planet has faced the struggle between life and death. Every issue must be resolved solely by research experts in all fields and future pillars with a desire to overcome society's challenges. One of these changes resulted in a smaller shift in a minute and second-hand power rather than manpower.

In today's generation, the health sector is in a crisis state, making it difficult to extinguish the fires that have ripped a hole in people's tough health screens. Every advantage and disadvantage of living and non-living environments are entangled, resulting in the emergence of numerous diseases or illness, posing a threat to future generations of humans.

Though vaccines can help to prevent long-term infectious diseases, it is critical to take medications as advised by experts at the appropriate times to avoid secondary infections and cure the diseases. When technology supplanted traditional manpower, people's inherent abilities began to disappear. Furthermore, due to time constraints, people were less concerned about their health. It should be emphasized that people's life spans

have dropped and they have lost their basic memory power compared to previous generations. When the problem of older persons feeling helpless in self-care was identified, the Ambient Assisted Living (AAL) framework was created to help them live independently.

II. LITERATURE REVIEW

In this study, a concept for an Arduino AT mega-based pill reminder is suggested. This device will help patients take their pills in the right amount and at the right time. One such product that can be quite helpful to a person is assistive technology. However, due to expensive costs, a lack of awareness about the subject, and limited availability, just 2 out of 50 persons use assistive technology today. By 2050, one assistive device will be required by ten out of every twenty homes, with many senior people requiring two or more. It is also seen that people prioritize jobs over health. By reminding patients to take their medications on time and as directed, this strategy aims to solve this problem. All ages will benefit from this tangible and digital reminder for a patient, but geriatrics who frequently forget to take their meds would especially benefit from it. The main objective is to make the system easy to use and affordable. To remind patients to take the prescribed dosage at the prescribed time, this system has an Arduino, LCD display, Real-Time Clock (RTC) module, RFID system, and alarm system. Elderly patients, especially those who are illiterate, would benefit from this transportable and economical option. By reminding senior family members to take their Alert on time, our smart pill box can decrease their obligation [1].

Growing technology and lifestyle support health sectors in an exponentially modernizing globe. In this decade, only approximately half of the population is aware of their prescription regimen and takes full use of their medication. The other half of the population is preoccupied with their frantic daily schedules, which leads to incorrect drug consumption. Patients who are becoming older and are losing their memories frequently fail to take their medications on time. When a patient fails to take medicine at the appropriate time as suggested by the practitioner, the treatment becomes ineffective. Many attempts have been made to build a "Medicine Box" that would assist patients in keeping track of their medicines and preserving their medicine consumption information. This project intends to develop a "Smart Medicine Box" for medication that has

numerous compartments and an alert reminder to help the user take their prescription at the right time. A cooling system that adapts to the environment is used to maintain the temperature in this divided container. We suggest enhancing this system with additional medication box features including high security, SMS emergency alerts, and automatic lid opening and closing. Vital parameters are recorded, sent to the cloud, and professionally analyzed using an IoT system. In order to effectively treat their patients, professionals are able to gain more knowledge about their patients' medical issues. Patients can live more freely because they no longer need to carry Alerts and medical records with them thanks to the ability to upload patient data and records [2].

Whether they are our elderly relatives or those with special needs, there are many people who need ongoing assistance. These persons appear to require care that most busy family members are unable to supply. Some people might forget what medications they need to take or to take them on time. As a result, we created this project to assist them with this liability. People are given a smart med box with a display that informs them about the medicine. We can also use an alarm and light indicators to inform them. As a result, even if the individual is sleeping or otherwise occupied, the alarm will help to wake him up. We can add one button at the opening end of the pillbox to confirm whether or not the person has taken that drug. When someone tries to access the box, the button is pressed, and the alarm is only turned off if the buzzer is hit. We can tell that the person has taken the drug based on this information. It also has a feature that allows the user to warn others when they are feeling anxious or in an emergency by pushing the device's button. There are two buttons: one to alert the doctor and the other to notify the patient. There are two buttons: one for notifying the doctor and the other for notifying family members about the emergency. Node MCU, Pill Box, Buzzer, Reset Button, and Mobile App are some of the key terms [3].

The development of IoT health care is seen by many as having substantial advantages for the elderly. Medication must be taken regularly and on time by the elderly and others with chronic illnesses. Caretakers may lose track of instructions and time when it comes to the tablets that have been given to the patient due to their busy daily schedule. Additionally, caregivers who are managing a big number of patients could find it challenging to organize the medication list for the right patients at the

right time. There has been numerous research done in this area, as well as numerous pill boxes available. The intelligent medication box that is the subject of this study offers unique features including six sub-boxes that help arrange six different medications and send timely reminders to the patient or caregiver in an android application for portable devices like smartphones. A biosensor for temperature and heartbeat monitoring is included in this smart medication box. Elderly people who misuse or use their medications incorrectly can develop serious health issues. A quick authentication procedure is used by either the caregiver or the patient themselves to prevent this. The suggested medication is much safer because it makes it clear when to take it, how much to take, and how much is on hand. It also allows the caregiver to sort out different pills that were placed in the incorrect sub boxes during the subsequent fill [4]. This research suggests sophisticated monitoring, analysis, and control system for medicine boxes. The latter concept is built on a smart, secure medicine box that helps patients remember to take their medication on schedule. This system has two main functions: safety, which ensures the patient's well-being and the system's proper operation by duplicating the electrical components, and security, which assists in preventing children from accessing the medication by checking the medical box each time the patient takes a pill. As it will be connected to a phone application, this system can also be watched over by the concerned parents. This application will be used to set up the medication box by calculating the weight of each pill, establishing the dosage schedule, warning the user when there are still pills left, and creating alarms whenever the patient doesn't take the prescribed number of pills or doesn't take any at all, and so forth. More than 50 patients using various mobile phones and taking various medicine types (each patient only takes one drug) participated in the implementation and testing of this system. With a defective alert generating rate of around 3 percent, the overall results were extremely acceptable [5].

The main objective of this project is to develop a smart medicine box that will remind elderly or hospitalized patients to take their medications in accordance with the recommended dosage and timing. To store the medication, the device contains twenty-one airtight chambers. A patient's attendant or nurse can make a weekly schedule for pharmaceutical leftovers by storing medication in twenty-one compartments for three dosages each day. The attendant has two options for

setting the time for taking medications: manually or by loading a text file with the dosage times for each compartment onto an SD card. The time can be read from the device's real-time clock. When the time matches the predetermined time, the device produces a sound through the speaker to alert the user of the quantity of medicine and blinks the LED of the specific compartment where the medication is stored for that time. The device also tells the patient whether to take the medication before or after eating. The device can guarantee pharmaceutical safety, proper Alert dosage, and the avoidance of elderly drug addiction [6].

The long-term planning of healthcare and medical infrastructure is impacted by the increasing global population. When compared to other older people, health difficulties are more prevalent, especially for older persons. It is difficult to recall the medications that doctors prescribed for those health conditions to elderly patients. Particularly in cases of diabetes and high blood pressure, people must take their medications in the prescribed dose at the suggested time and frequency. To solve the issue, an IoT device is created to remind elderly individuals and their caregivers when to take their medications. The system's integrated IR sensor will continuously check to see if the patient is taking their medications as directed. The caregivers' smartphones and watches have received notifications via GSM. So, as a safety net for patients, we build a pillbox. The system's main goal is to help patients take their prescribed medications on time and to tell their families so that less effort is required of them [7].

Those in charge of a patient's or elder's medication must sort through a lot of tablets each day, which leads to many medical errors. This project focuses on the development, design, and production of a pillbox prototype that intends to fill this medical industry gap by automatically sorting pills and providing a range of additional cutting-edge features, with the device being used in hospitals or senior living facilities. This pharmaceutical pill box is intended for elderly caretakers as well as patients who regularly take prescription drugs or vitamin supplements. Our programmable smart pill box enables customers or medical professionals to specify the daily service times, dosage, and timing for tablets. Nine little boxes make up our nifty pill box. This allows medical professionals or clients to set data for nine different medications. The pillbox will employ sound and light to remind clients or patients to take their meds once a pill time has been established. The patient's

android device will display a warning that it's time to take their pills. Unlike the conventional pill box, which calls for users to stack the crate on a daily or regular basis. Our ingenious pill box would essentially preload pills for patients or clients while ignoring the appropriate measurements, effectively discharging medical staff or clients' weight on a regular basis [8].

With a rapidly growing population, it has become increasingly difficult to monitor and care for the health of patients with chronic conditions, particularly in the case of older individuals who are unable to care for themselves. As a result, we developed a smart system that can track the patient's health and dosage. The patient's health will be continuously monitored by a smart sensor, which will relay the readings to the Arduino board. The Arduino board will also be connected to boxes containing the patient's Alert medications. Each box will have its own timing data, which will be compared to real-world time on a regular basis. If the information is correct, an alarm will sound, reminding the patient to take his medicine [9]

III. METHODOLOGY/EXPERIMENTAL

A. Materials/Components

   i.   Medicine Box

It is a general plastic box in which we keep our medicine but in a sorted way, it consists of several blocks to store different medicine which will be consumed at different times.

   ii.   Arduino

The ATmega328P microprocessor is used on the Arduino UNO microcontroller board. The board has a 16 MHz ceramic resonator, six analogue inputs, 14 digital input/output pins (six of which can be used as PWM outputs), a USB connection, a power jack, an ICSP header, and a reset button. Everything you need to get started using the microcontroller is included; all you have to do is connect it to a computer using a USB cable, or you can use a battery or an AC-to-DC adapter to power it. Without worrying about making a mistake, you can experiment with your UNO; in the worst case, you can replace the chip for a few dollars and start over.

   iii. Buzzer

A mechanical, electromechanical, or piezoelectric audio signalling device called a buzzer, also referred to as a beeper, Buzzers and beepers are frequently used in alarm clocks, timers, trains, and to confirm user input like a mouse click or keyboard stroke.

   iv.   LEDs

Light is produced by a light-emitting diode (LED) when electricity flows through it. In the semiconductor, when electrons combine with electron holes again, photons are created. The color of light is determined by the amount of energy needed for electrons to cross the band gap in a semiconductor (equivalent to the energy of photons). White light is created by combining many semiconductors or covering a semiconductor device with a light-emitting phosphor.

   v.   LCD Display

The term liquid crystal display is referred to by its acronym, LCD. A variety of circuits and devices, including mobile phones, calculators, computers, televisions, and so on, use this kind of electronic display module. The most popular applications for these displays are seven segments and multi-segment light-emitting diodes. The main benefits of using this module are its low cost, ease of programming, animations, and the lack of limitations on displaying special and unique animations, characters, and other content.

   vi.   Push Button

A pushbutton, often known as a button, is a straightforward switch mechanism used to manage a machine or procedure. Most buttons are made of strong materials like metal or plastic. For easy depressing or pushing by a human finger or hand, the surface is often flat or curved. Buttons are often biased switches, even if many un-biased buttons (because to their physical nature) still need a spring to return to their un-pushed state. Pushing a button is sometimes referred to as pressing, depressing, mashing, slapping, slamming, or punching.

IV. RESULTS AND DISCUSSIONS

A. Design

Fig. No. 1: Design of Casing for Medicine box
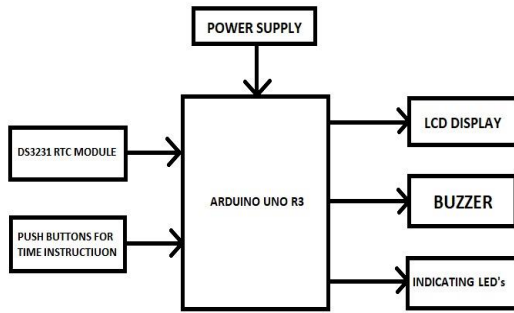
B.   Flow chart

Fig. No. 2: Flow chart

An IoT based health care box is created to assist patients in taking their medications on time. Using an Arduino Uno R3 and a variety of components, the medicine box buzzes an alarm in accordance with the time set and also glows an LED light to help identify the medication that needs to be taken. As you can see from the box's outer casing in the above figure, there are many compartments in the box where you can store various medications. This project will mostly benefit Alzheimer's patients and certain older folks who are in need.

V. LIMITATIONS

Data Privacy- Privacy is a major challenge, as all connected devices transmit data in real time. Personal data can be lost if this connection to the end is not secure. Accuracy- Accuracy problems may come as a result of handling such large data in real time. Costs- It may reduce the cost of diagnosing and treating patients, but the cost of installing all the devices and their maintenance is quite high.

VI. FUTURE SCOPE

In the future, we hope that the application can be connected to med karts so that, in the event that the pills run out, it immediately sends a message of alert to the med kart, which can then assist us in having the prescribed tablets delivered to our door. Using image processing technologies, the Alert may be scanned in order to load the app.

XIII. CONCLUSION

This object at an end of the present work proposed a low-cost medicine alert box system employing a robust architecture to support users in addition to health professionals during medicines consumption. Hence, a medicines alert box designed with embedded systems based on IoT technology to overcome the disadvantages of patient's ambient assisted living (AAL). The compartmentalized box design for thrice in a day helps the patient to store drugs in addition to consuming the drugs easily (i.e.) user amicable. Presently there exists no complication in the usage of smart medicine boxes such that objects over there the people don't request any training to handle medicine boxes. Thus, the aim of ambient assisted living (AAL) for a patient was successfully achieved using a fewer complications design.

The solution currently still exists as a proof-of-concept developed in addition to needs to exist improved in addition to evaluate. The proposed architecture enables to embody other types of devices such as wearable, electronic devices, and place of residence appliances, among others, offering infinite possibilities of applications in addition to functions. This object over here system currently can exist improved, providing a more flexible way to schedule medicines consumption alarms such as twice a week, three times a week, or every other day, among others.

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REFERENCE

[1]   Doshi, V., Dey, S., Mehta, N., & Prasad, R. (2019). An IOT based Smart Medicine Box - IJARIIT.

[2]   K. Bhavya, B. Pradeepa, S. Anandhapadmanaban, A. Ashifa, S. Sanjay Kumar, & R.Suryalakshmi. (2020, June). An IOT Based Smart Medicine Box for Medication. AN IOT BASED SMART MEDICINE BOX FOR MEDICATION.

[3]   Naga Swetha R, Mahendar, Roopsingh, & Chinna. (2018). Smart pill box using IOT - troindia.in. SMART PILL BOX USING IOT.

[4]   B.Ayshwarya , & R.Velmurugan. (2021, March). Intelligent and Safe Medication Box in health IOT platform for Intelligent and Safe Medication Box In

Health IoT Platform for Medication Monitoring System with Timely Remainders.

[5] ZEIDAN, H., KhalilHalil KARAM, HAYEK, A., KARAM, K., BOERCSOEK, J., & ZEID DAOU, R. A. B. I. (2018, October). Design of a safe and smart medicine box - researchgate. Smart Medicine Box System.

[6] Kader, M. A., Uddi, M. N., Arfi, A. M., Islam, N., & Anisuzzaman, M. (2018, October 28). Design & implementation of an automated reminder medicine box for old ... Design & Implementation of an Automated Reminder Medicine Box for Old People and Hospital.

[7] Harshitha V, Sandeep K, & Swasthika Jain T J. (2022, May 31). International Journal of Engineering and Advanced Technology (IJEAT).

[8] Diaa Salama Abdul Minaam, & Mohamed Abd-ELfattah. (2018, November 29). JavaScript needs to be enabled for this application to run correctly. Elsevier Enhanced Reader.

[9] Fasahate, M. A. (2018, February 2). Smart medicine box using IOT - IJSER. Smart Medicine Box Using IOT.