



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 11, Issue 6, June 2022

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.118

 9940 572 462

 6381 907 438

 ijirset@gmail.com

 www.ijirset.com

Development of Smart Medicine Box Using Raspberry Pi PICO

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ABSTRACT: In our day to day life, due to busy schedule and workload, people often forget to take their medicines on time. Especially, old aged people having illnesses and who are illiterate have problem while taking the medicine and also there exists one more problem i.e., tracking the medicines with poor eyesight and also consumption of that medicine leads to errors such as mis-dosage which leads into trouble. Sometimes it's not possible for the family members to give them medicine at prescribed time. In this project the development of smart medicine box system using Raspberry Pi Pico. Here the proposed design is based on a smart and safe medical box that assists patients in taking their pills on advised time. When switch is on then after 30 sec the corresponding LED's will be ON and message will be displayed on the LCD in order to indicate the patient & also there are some alerting systems to take pills on time. Hence this project gives effective results.

KEYWORDS: Raspberry Pi Pico, LCD, LED, Buzzer.

I. INTRODUCTION

The autonomy of patients is a hot topic nowadays. Researchers are working to improve, not only this factor, but also the easy monitoring of the patient. Thus, the proposed system consists of a safety-related medical box that can alert the patient via a phone application, about the time to take his medication and if the correct medicine dose was taken, the number of remaining pills in the box and auto-locks the box to keep the medicine out of reach of children. This system is for sure, not the first one that helps monitoring and assisting patients. Several previous published works have proposed such systems as the design of smart homes fully equipped by sensor, the monitoring of patients walk and fall, the telemedicine systems that monitors patients from home, and much more added to that, as mobile phones are playing an important role in today's life the connection of such medical systems to mobile devices is increasing dramatically due to the ease of monitoring and alarm generation. As a human-related system is proposed, the safety and reliability issues are to be considered.

These features must be provided mainly when transmitting data whether by making sure of the correct data delivery or the exact receiving part. These terms were already defined by IEC (International Electro-technical Commission) in 1977, then in 2007 for medical devices. It is defined as being any device connected to a patient in order to monitor, analyze and/or treat them. Even though medical boxes systems were presented in several previous works, none of them has integrated safety and reliability to the system neither system duplication nor hardware failure measures were proposed by the developed systems. Thus, this system deals with these inquiries: although it is a low-cost device, it is able to communicate through a phone application and to remind patients to take their correct medication dose on time. All these features are integrated while keeping a special attention on the system safety and failure safe state. According to Health Facts 2015 in Hospital Kuala Lumpur (HKL), the number of admissions of the patients for 2015 are 131, 639



while 128, 836 is the number admission of the patients in 2014. The increasing number of patients will increase the number of wards needed to cater all. Therefore, the nurses will be busy to handle the patients at the same time. Nowadays, the nurses still used the manual method to give the medicine to the patients. They will go to the patient's bed for three times per day and give the medicine to the patients. By using this method, the nurses will waste the time because they should go to the patients ward one by one. Besides, they also cannot monitor the patients properly because they do not have enough time because they will busy to monitor the other patients.

The patients will skip the medicine by throwing them in the dustbin. Some patients who are introverts prefer to be alone. Introverts are known for gaining energy from spending time alone. Usually, they will stay in the private ward and do not like to share that ward with another person. Introversion is the common ways of defining personality types that describe how individuals derive their energy, process information, and respond to stimulation. For this problem, there is no specific solution that can help the nurse to solve this problem. They just can give the advice to take the medicine and monitor them if they have enough time to do that.

This project is developed to help the problem occur with introvert patients. The smart medicine box is to solve and help the nurse to handle the introvert patients specifically. Nowadays, the world and the scientists are targeting more and more the autonomy of the patients by developing advanced tools that can help them being not only autonomous but monitored at the same time. Hence, the proposed system aims to offer one new tools for this community. This system consists on a smart medical box that can alert the patient by altering system to take their medication, the number of remaining pills in the box. Here, the errors in taking the medicine i.e., skipping of medicine can be avoided by keeping the room under CC camera surveillance or by using a phone application. Added to that, the use of phone applications is getting more familiar in biomedical engineering applications mainly for monitoring purposes. In fact, the availability of such devices with almost all people has increased its use in several engineering domain, mainly the biomedical industry. However a special attention should target safety issues especially when sending/receiving data and security issues to deny the availability of data for non- authorized persons.

The system also contains some duplications (at the hardware and software levels) to reinforce the safety and availability issues and to decrease the probability of system failure or faulty alarms. Although the proposed system can handle one medication type only, it can be used for lots of patients, mainly psychiatric, cancer and Alzheimer patients. In fact, the first category risks not to take medication or to take a bigger quantity than specified by the medical doctor in order to put an end to its life, whereas the second category risks to forget or take medication more than once because of memory problems. Now a days, Technologies requires updating with growing generations who adopts the modern lifestyle. In modern lifestyle, improper habits from dinning to bed, intake of health less food decreases the lifespan of people. The needs and necessary of countries makes the scholars to invent or discover to bypass Technologies to overcome their drawbacks. Each and every inventions or discoveries had its own drawbacks which had its effects with specific human organs.

These various diseases arrived in human body due to incompatibility of food and other technological environment with human immune system. As the cost of products goes hike there peeks an economical and financial issues in a country. There after, people want to run behind busy schedule to accomplish their daily commitments.

In addition to the existing works, this projects helps monitoring of patient's vital parameters to reduce the multiple times of hospital visits with clinician by patients. Alongwith Host Management System (HMS), the vital parameters are stored in the cloud serverspecially made for clinician review. Hence, this project of appropriate temperature storagebox of medicine assists elder patients to live independently in taking care of their medication schedule by reminder alarm with automatic wireless transfer of their health



II.LITERATURE SURVEY

According to World Health Organization, over 80% of the people above the age of 60 years are prescribed medicines that are to be administered 2 - 4 times a day. With the increase in Cardiovascular diseases and Diabetes among the peer group regular medicine administration has become a necessity. But among this another 40-60% is having the issues related to forgetting the taking of medicines at right time. We found several different pillbox products available in the market. The cheapest one was the traditional pillbox, which contained seven boxes for seven different days of a week. Such pillbox normally cost around 200 INR. However, user had to load the pills to the boxes every week. At the time of loading pills in the box, people many time mix their pills with other pills in the same box would increase the risk of making mistakes. Another type of pillbox in the market is also available, which had the sound reminder, and was able to remind the user to take medicine at user specified time but it only remind the user at once a day. The costs of this type of pillbox were so high about 1000 INR, Therefore, we think it was necessary to build a cheap and functional smart Medicine box that could bring more convenience for the user.

As the era is changing most of work is done using automated systems. Automated pillbox are created especially for elder people, so as they can take the medicines on time. Pillbox have alarm system which reminds people to take medicines on time. Many such automated pillbox are there in the market, different companies create them with different functionalities. For example, GMS MED-E-LERT automatic pill dispenser, electronic dispenser, E-Pill's tamper proof automatic medication dispenser, etc. The pillbox available in market includes alarm system but lack in much other functionality. Recently, pillbox was modified by many researches and new features are added. For instance, a pill box called as "The Intelligent Pillbox" proposed in uses Assistive Technology to open and close then pillbox automatically. In the Pill Dispenser with Alarm via smart phone notification IOT technology was used which generates reminder as proposed time but there was no confirmation feedback. In next Paper "Enhancing Healthcare using m-care Box" uses Alarm notification service but in this paper there was no feedback notification and it was oriented for single user According to the financial conditions of the user the user purchases the pill box, here for the demonstration purpose we use normal pill box which consists of four boxes i.e., four medicines to be taken in a day daily. Based upon the size of the boxes the tablets are filled by the care-taker.

"A smart Pill Box with remind and Consumption confirmation function" camera were use in the compartment but it was costly as well as complex to put camera in every compartment. So far, there is no pillbox which gives proper feedback of whether the medicine is taken or not, to the user. Hence, we are designing a pillbox which will give proper feedback of confirmation to the smart phone user using mobile application. The data will be stored on cloud or the whole room will be under CC Camera surveillance.

III.METHODOLOGY

As pills have taken such an important role in everyday life there has been the past years an increase in the number of medical neglect cases related to incorrect medication given to patients, such as the case of the nurse who gave a patient a paralytic instead of an antacid that was prescribed by the doctor, causing the patient's death. After seeing so many of these cases it is evidently crucial that the correct pill is taken by the correct person at the correct time, otherwise taking an incorrect one or not taking one at all may expose the patient to several dangerous situations, ranging from mild health issues up to death. The autonomy of patients is a hot topic nowadays. Researchers are working to improve not only this factor, but also the easy monitoring of the patient. Thus, the proposed system consists of a safety-related medical box that can alert the patient. As a human-related system is proposed, the safety and reliability issues are to be considered. It is defined as being any device connected to a patient in order to monitor, analyze and/or treat them.

3.1 BLOCK DIAGRAM:

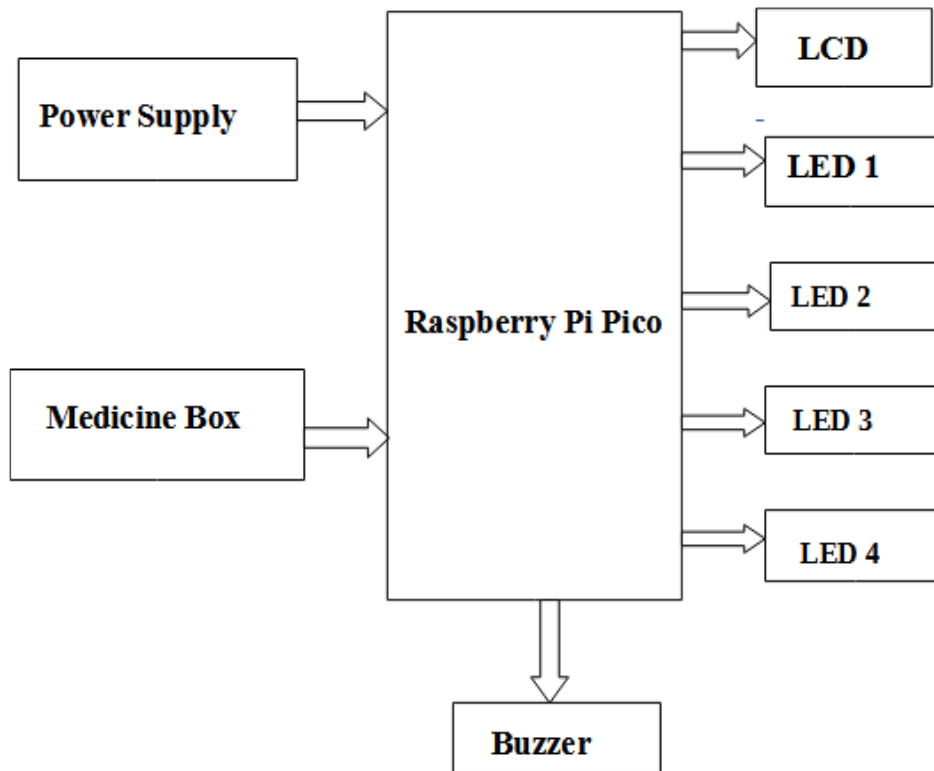


Fig.1.Proposed system Block Diagram

3.2. Working Principle

Here the proposed design is based on a smart and safe medical box that assists patients in taking their pills on advised time. When switch is on, then after 30 sec then two led 1 & led 3 will be on and displays on the LCD, at the same time buzzer starts ringing. Similarly next two leds will be on in the evening and displays on the LCD to indicate the patient to take pills on prescribed time. As soon as the medicine is taken by the patient they should off the switch.

3.3. Hardware Components

- ❖ RASPBERRY PI 3+
- ❖ Buzzer
- ❖ LCD

IV. RESULTS

Finally the proposed system has overcome the problem facing by elder citizens. Users will be alerted by alarming systems in order to take correct dosage of medicine

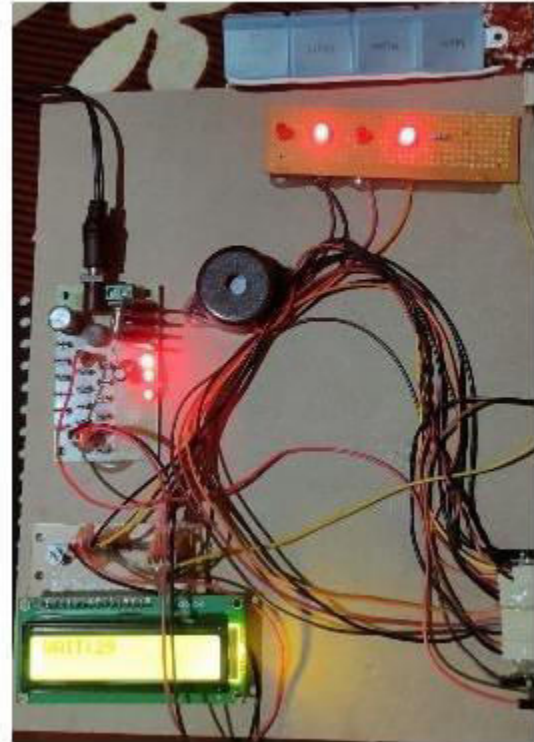
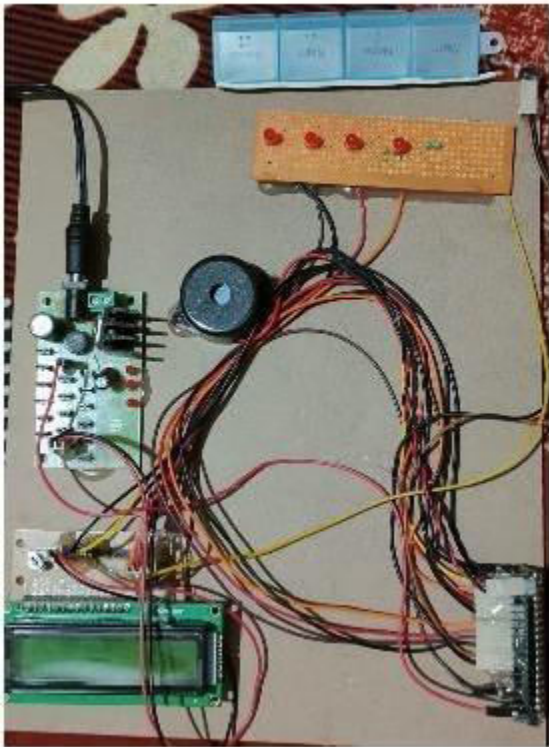


Fig.2.(a).System without power supply (b) System with power supply

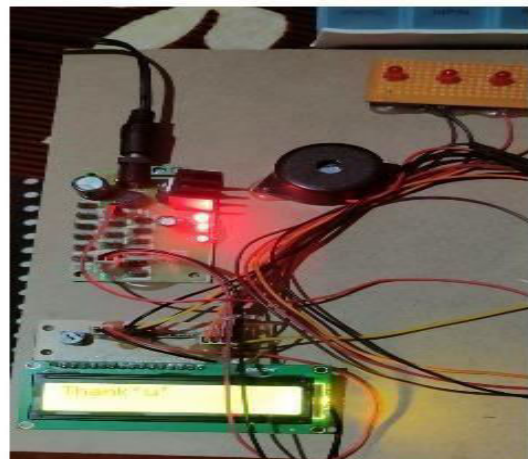
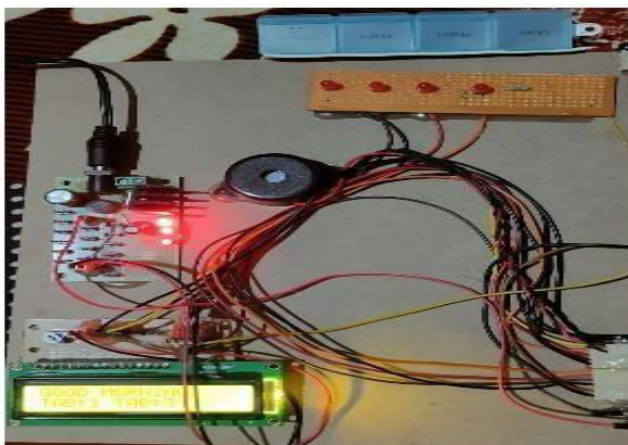


Fig. 3..Module Displaying Morning Time Tablets

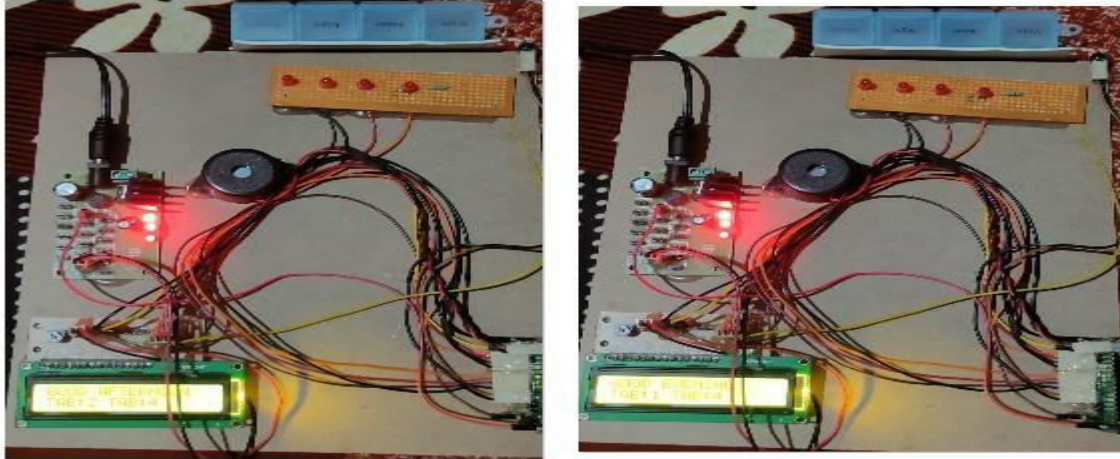


Fig .4. Module displaying Afternoon & Evening time Tablets

V.CONCLUSIONS

This project has focused on the problems faced by senior citizens concerning adherence to their prescribed medication. It not only aids the elderly who live independently but also the caretakers of the elderly by reminding right amount of medicine at the right time. Most of the old age people have multiple medicines to take to overcome their illnesses. Many deaths occur due to wrong medication on wrong timing, or not taking medicine at all. Hence In this project the development of smart medicine box system using Raspberry Pi Pico. Here the proposed design is smart and safe medical box that assists patients in taking their pills treatment on time and also this smart medicine box using Embedded platform has been experimentally proven to work satisfactorily. This medicine box is useful and a user friendly tool for all of us. This provides a greater efficiency to our project. This is cost efficient also.

The other advantage of this box is that it is very easy to use and the complexity is less. The smart medicine box using this platform has been experimentally proven to work satisfactorily. The number of research studies are underway to provide evolution by cross over study such as offline application for patient health data storage and as well as the future enhancement to MEDIBOX is to be done. The pill counter setup using IR sensor can be imported in cloud or by suitable application to assist caretaker or patient to refill the medicine box. The more health sensors can be added to get patient health details to be more accurate. The medicine box can be provided with high security with second authentication i.e., fingerprint recognition & voice recognition for strong security.

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Impact Factor: 8.118



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