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Automatic Medicine Dispenser

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ABSTRACT

It is common for patients, especially the elderly, to forget to take their medicines and not follow the dosage prescribed by their doctors. This is termed as drug non-compliance. Overuse, forgetfulness, and self-alteration of doses are some common forms of drug noncompliance found. Yearly 1.5 million subjects are affected by preventable medication mistakes. Errors of medication often tied to diabetics increased by over 300 percent.This report deals with the development of an "Automatic Medicine Dispenser" to manage the very real problem of patients confusing the dosage and timing of their medications, particularly vulnerable patients or patients on numerous medications. This medicine dispenser, implemented by us as a part of our project, will contain all the prescribed dosesand will dispense them at accurate timings i.e. preset time intervals which can be programmed through a simple interface. It will also provide alerts and daily reminders for the user to consume the dispensed medicine at the right time and hence reduce the risk of overdose or wrong medication. The components used are also easily available making "Automatic Medicine Dispenser" very inexpensive as compared to the current solutions in the market.

Keywords: Automatic Medicine Dispenser, Arduino Uno, Medication Adherence, Real-Time Clock (RTC), Servo Motor, Automated Pill Dispensing, Medication Reminder System, Buzzer Alert System.

I. INTRODUCTION

Around 41 million (about twice the population of New York) people die annually from noncommunicable diseases, accounting for 71 % of all deaths globally. It is expected to increase by 17 % by 2025.The primary non-communicable diseases are cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes. They require rigorous medication adherence for an extended period to prevent or minimize their symptoms. One of the frequent problems for medication adherence is remembering the right time to ingest the right medicine.It is a well-known fact that with increasing age, a person's health slowly deteriorates and so does his cognitive skills. Due to the reduction in his cognitive skills, taking medicines regularlybecomes very tedious and bothersome and leads to skipping or forgetting the medication routine, or consuming wrong medicine by mistake. This forgetfulness or confusion in consuming medication can harm a person's health and bring complications.

Hence, we propose to make a device which will hold all the prescribed medicines of a patient and it will also prompt him when it is time to take his medicines.The project Arduino-based medicine dispenser presents a simple, low-cost, and intuitive implementation of technology in the health sector. The medicine dispenser uses an Arduino as a controller, for timekeeping uses a real-time clock (RTC) module, uses a servo motor to take medicine from the medicine container and dispense it, uses a buzzer as an alarm when taking medication, and a push button is deployed which the user has to press once he/she takes the pill after it is dispensed.

Our device will be particularly useful to the elder people, as they have to take multiple medicines many times a day but it can be used by other people as well who are prescribed to take multiple medicines regularly. This device will also reduce the dependence of elder citizens on other people or helpers to take their medications on time.

PROBLEM STATEMENT

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Taking medicine at the right time can be hard, especially for the elderly and also for people who need to take multiple medications at different times of day. However, this can lead to severe health complications and become dangerous. So,in this project, we built a medicine dispenser that will automatically dispense the pills at the right time and also remind the user to take the medicine by setting off an alarm.

AIM & OBJECTIVES

General Objective:

The project's main objective is to design, implement and test the prototype of an Arduino-based medicine dispenser that is simple, low-cost, and easy to build.

Specific Objective:

- Design a prototype of a medicine dispenser machine utilizing the Tinkercad simulationsoftware.
- Design a mechanism to dispense the medicine.
- Implementation of an alarm system using the real-time clock.
- Alert using LCD display, LEDand a buzzer.

II. IMPLEMENTATION

Once the design phase was completed, the electronic circuit of the medicine dispenser was simulated and tested using Tinkercad. The implementation phase involved building the medicine dispenser with hardware components and developing the software component. Arduino was connected to the computer and programmed using Arduino IDE.

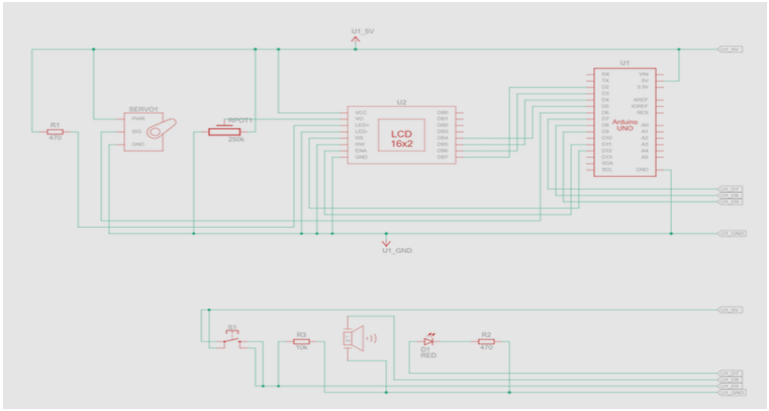


Figure 1: Shows the lay out Diagram

Verification

After the implementation phase is finished, the next phase to follow is verification phase. The functionality and durability of the medicine dispenser are evaluated. This phase involves ensuring the product can meet objectives. The virtual circuit was designed and tested in the Tinkercad platform.

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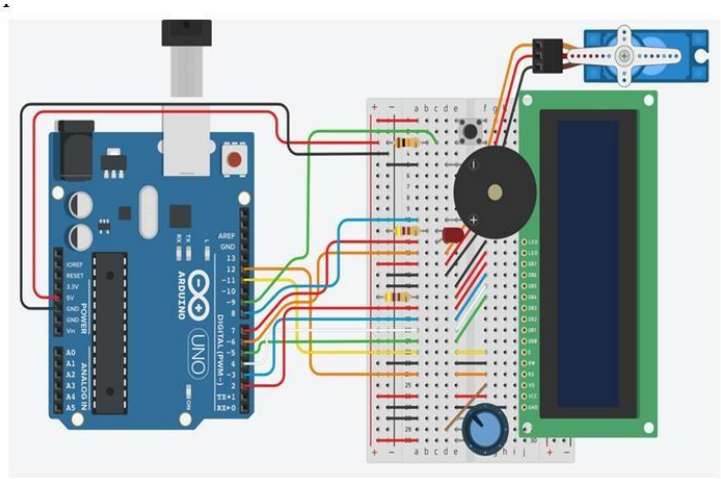


Figure 2 : Shows the Arduino Board

Maintenance

This phase involved fixing any issues that came up after the medicine dispenser was designed and built. The LCD display was faulty at times due to improper soldering.

III. RESULTS AND CONCLUSION

A. Description of the Proposed Error Correction Code The proposed error correction code introduces an innovative approach to enhance the reliability of memory systems in space applications. This methodology is centered around a 2-dimensional code structure designed to address the limitations of traditional error correction codes (ECCs), especially in detecting and correcting burst errors. The code employs an advanced scheme of XOR operations, augmented by Cyclic Redundancy Check (CRC) techniques, to ensure comprehensive error detection and correction capabilities.

B.XOR Operations and Their Extension for Larger Data Blocks.

At the heart of the proposed error correction technique are extended XOR operations, which form the basis for both errordetection and correction processes. Traditional ECCs utilize XOR operations to generate parity bits, which are then used to detect and correct errors within small data blocks. The proposed method extends this principle by applying XOR operations across larger blocks of data, enhancing the system's ability to detect and correct burst errors that may span several bits. This extension is crucial for space applications where such errors are more prevalent due to exposure to cosmic radiation and other environmental factors.

The encoding process involves dividing the input data into multiple groups, with each group undergoing XOR operations to produce a set of diagonal bits, parity bits, and check bits. This results in a coded output that includes the original data bits, along with the additional redundancy bits necessary for error detection and correction. The extended use of XOR operations allows for a more robust identification of error patterns, particularly those characteristics of burst errors.

C.Use of Cyclic Redundancy Check (CRC) for Improved Error Detection and Correction

To further enhance the error detection and correction capabilities of the proposed code, Cyclic Redundancy Check (CRC) is integrated into the methodology. CRC is a wellestablished technique known for its high reliability in detecting errors in digital data. By incorporating CRC, the proposed error correction code gains an additional layer of security against data corruption, significantly improving its efficacy in space applications.

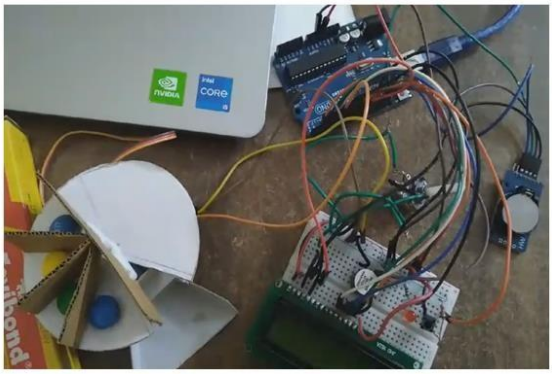
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The CRC algorithm works by generating a unique checksum for each data block before transmission or storage. Upon retrieval or reception, the data block's checksum is recalculated and compared against the original checksum. Any discrepancy between the two indicates the presence of errors. The combination of CRC with extended XOR operations provides a dual mechanism for error detection and correction, ensuring a comprehensive solution to the challenges posed by burst errors in memory systems.

The proposed error correction code utilizes an innovative combination of extended XOR operations and CRC to offer superior error detection and correction capabilities, particularly against burst errors. This methodology represents a significant advancement in enhancing the reliability of memory systems for space applications, where the integrity of data is paramount.

IV. IMPLEMENTATION AND RESULTS

The medicine dispenser will dispense the medicine at the preset time mentioned in the program. After the pill is dispensed, the buzzer sets off an alarm and LED blinks till the user presses the button. If the user does not press the button, buzzer and LED will be on for 1 whole minute and then the dispenser will automatically dispense the next medicine. At the end of the day, when all the 4 pills are dispensed, user needs to fill the slots with pills. Since it is a demo video, we have shown how 4 pills are dispensed one after the other for every 1 minute interval instead of showing the dispensing mechanism at 4 different times of the day.

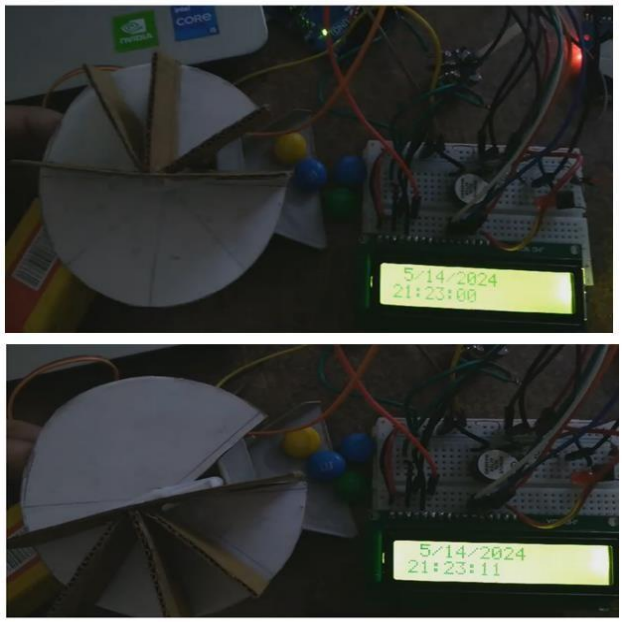


(a)



(b)

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(c)

Figure 3 : Shows the (a) Initial Postion when Power is OFF (b) When 1st pill is dispensed
(b) **When all four pillsare dispensed**

V. CONCLUSION AND FUTURE SCOPE

The Automatic Medicine Dispenser is designed and it is found that it is able todispense pills according to the timings set by the user in the program. This lab prototype is designed for dispensing medicine at maximum 4 times a day.

In conclusion, the development of an Arduino based medicine dispenser was a success. The waterfall methodology helped to keep track of the project and make it successful. The main objective was to design, implement and test the prototype the dispenser that is simple, low-cost, and easy to build.

The features mentioned below can be added to this project to make it more user friendly.

- Instead of a push button, an ultrasonic sensor can be interfaced to the Arduino board which can automatically detect the user's hand when he/she takes the medicine at the preset time.
- To indicate the existence of stock inside the dispenser, a weight sensor and LED can also be used.
- If the medicine is not taken by the user, a message can be sent to him by a GSM module.
- A keypad can be deployed for the user to change the medication timings whenever needed instead of changing in the program.

REFERENCES:

[1] https://www.sciencebuddies.org/science-fair-projects/project- ideas/Elecp105/electricity electronics/ automatic- pill- dispenser
[2] https://www.researchgate.net/publication/361255946_An_IoT_based_Smart_Medicine_Dispenser_ Model_ for_Healthcare
[3] Ajay Mathew, John Paul, Karthika Nair S, Sachin U.S, Srikanth Koncherry and Raghu "Design and Implementation of a Smart Medicine Dispenser" 2019 IEEE Region 10 Conference (TENCON 2019)
[4] Kamal Raj, Jabatini, Jainab Nisha, Mr. N. Prabhakaran "Automated Low Cost Pill Dispenser using Arduino and IoT with 24 Hours of Monitoring" International Research Journal of Modernization in Engineering Technology and Science, Volume:03/Issue:08/August-2021.

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[5] Thapa, Gaurav Bikram "Arduino-based Medicine Dispenser" Bachelor's Thesis



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