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IOT Based Smart Pill Box and Health Monitoring Voice Alert System

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ABSTRACT: In exponentially modernizing world the growing technologies and lifestyle aids health sectors. In this decade, the people those who are aware about their medication schedule is about 50 percent only and receive the full advantage of their medication. The other 50 percent of people are busy with their hectic day-to-day schedule which leads toimproper intake of drugs. Elderly patients with continuing loss of memory usually forgets to take medicine at right time. When the patient fails to take medicine at right time as per the clinician prescribed medication schedule the treatment goes ineffective. There had been many attempts to design a "Medicine Box" which helped the patients in medication remainder and storing the patient's medicine intake details. In accordance to current technology this project endeavour to make a "Smart Medicine Box" for medication with multiple compartments to assist the patient to take medicine at right time through alarm reminder. This compartment box maintains by means of adaptive cooling method. We propose this system with additionally added features to medicine box such as high security, emergency alert through SMS and automatic opening and closing of lid of the box. The vital parameters are recorded, uploaded to cloud and reviewed by the clinicians using IoT system. This helps the clinicians to gain knowledge about their patient's health condition for further treatment analysis. The feature of uploading the patient details and medical records avoids the difficulties of carrying the prescription and medical records and hence patient can live independently.

I. INTRODUCTION

The evolution of advanced technologies arrived to make the current technologies flexible to the world's obstacles. Every day per year hikes the birth rate than the death rate resulting in suffocated population in every country. Simultaneously, the demand for resources and basic requirements had risen in every country. The struggle between the life and death was experienced by all living creatures of the world. Every issue must be sorted out only by research scholars of every field and future pillars who are appetite for solving the society's obstacles. One of those innovations made lesser shift of minute hand and second hand rather the man power. The innovation of automation and the robotics were wisely generated in sense of survival of the fittest in the world as a recent technology. There occurs an emergency condition in the world to handle the world's economical debts and duties to be balanced for the country's people by authorizes and hence people are still dumped into hectic schedule in their routine life. In current generation, the health sector is in critical status difficult to put off the fires which made hole in tough healthy screen of people. Every pros and cons of living and non-living environment are coiled each other leading to budding of various diseases or illness putting danger in every humans of growing generations. Though vaccines can prevent the prolonged infectious diseases, it is vital to take medications as prepared by clinicians at prescribed time to prevent secondary diseases as well as cure the diseases. When the technologies replaced the traditional man power, the natural abilities of people faded. In addition to people lacked health conscious due to time demand. It should be noted that life span of people decreased and lost the basic memory power than the traditional days. When the obstacle of older people who felt helpless in self taking care of their health was noticed, Ambient Assisted Living (AAL) framework was designed to assist them to survive independently [4]. As told earlier involving technology saves time, Internet of Things (IoT) connecting billions of medical devices and assists to operate remotely are termed as Internet of Medical Things (IoMT). If the critical health status is known in seconds byconnection through internet, then there's a highly chances are provided to save a life.Hence, the project of MEDICINE BOX designed to offer Ambient Assisted Living for the older patients and people committed to hectic schedule in their daily life activities. It is an arduinoprogrammed IoT connected box along with purpose of storing medicines or drugs at appropriate temperature at specific compartments provided [1-2][4]. The obstacle of slow degrade/total loss of memory about specific events like date and time, count, numbers affects the

patients from taking their clinicians prescribed medicines regularly and results in treatment ineffective.

II. LITERATURE SURVEY

2.1. SMART MEDICINE BOX WITH ANDROID APPLICATION
Author: Savithaa. N et al.
Year: 2021
Published In: 6th International ConferenceOn Advanced Computing And CommunicationSystems (ICACSS).

Abstract:
In their 2021 study, Savithaa. N et al. introduced a smart medicine boxwith an accompanyingAndroid application aimed at enhancing medication adherence and management.The system leverages IoT technology to providepatients with real-time access to their prescriptionsvia a smartphone application, alongside notifications for medication intake. The medicine box features multiple compartments, each illuminated by an LED indicator to signify the correct section.In the event of accessing the wrong compartment, an Arduino-based warning system triggers,enhancing medication safety. Through a Wi-Fi shield connected to the Arduino board, datatransmission occurs seamlessly, facilitating remote monitoring and control. Servo motors enable theopening and closing of compartments, controlled by electrical signals from the Arduinomicrocontroller. Equipped with an alarm and LED display, the device is user-programmable,offering a comprehensive solution for medication management. With integrated vital parametersensors, the smart medicine box offers additional health monitoring capabilities, further enhancingits utility. Its user-friendly design ensures accessibility for patients of all ages, eliminating the needfor specialized training. Instructions are conveniently displayed on an LCD screen, simplifyingoperation and promoting medication adherence.

2.2. MEDICINE BOX WITH IOT TECHNOLOGY
Author: Divya Sai. K et al.
Year: 2021
Published in: 6th International Conference OnAdvanced Computing And Communication Systems (ICACSS).

Abstract:
In their 2021 publication, Divya Sai. K et al. introduced a novel medicine box integratedwith IoT technology for efficient medication management. The smart pill box, equipped with anArduinoMCU, LEDdisplay,LEDs,buzzer,buttons,Pulse Sensor, and Temperature Sensor, enables remote scheduling and configuration of medication dosages. Through a Wi-Fi module,configuration data is transmitted to the pill box, facilitating user-defined medication schedules. Atdesignated times, the corresponding LED illuminates accompanied by a buzzer, signaling thescheduled dosage. This cost-effective and user-friendly solution empowers individuals topersonalize their medication timetables, ensuring adherence and accuracy. Furthermore, itsreliability, longevity, ease of use, and manufacturability make it a promising tool for medication management.

III. PROBLEM STATEMENT

Patients may often fail to comply with theirmedicationwhether it was from forgetting to take the medicine, fromtaking medicine at the wrong time or even from taking too much medicine. Therefore, there are many systems such asreminder, alarm, and so on to remind patient. We havefocus on those patients who having difficulty to takemedication on time, we tried to design and to aid patientswith managing their medical prescriptions, through areminder app they will use to look at and manage theirmedications. The Pill Reminder will facilitate users torequire the right medication on time. This system provides a real time monitoring system that allow relatedpeople to monitor the patient's activity remote.

IV. INTERNET OF THINGS

The Internet of Things (IOT) is an important topic in technology industry, policy, and   engineering circles and has become headline news in both the specialty press and the popular media. This technology is embodied in a wide spectrum of networked products, systems, and sensors, which take advantage of advancements incomputing power,electronics miniaturization, and network interconnections to offer new capabilities not previously possible. An abundance of conferences, reports, and news articles discuss and debate the prospective impact of the "IOT revolution"— from new market opportunities and businessmodels to concerns about security, privacy, and technical interoperability.IOT systems like networked vehicles, intelligent traffic systems, and sensors embedded in roads and

bridges move us closer to the idea of "smart cities'', which help minimize congestion and energy consumption. IOT technology offers the possibility to transform agriculture, industry, and energy production and distribution by increasing the availability of information along the value chain of production using networked sensors. However, IOT raises many issues andchallenges that need to be considered and addressed in order for potential benefits to be realized.

V. PROPOSED SYSTEM

In this work, we have implemented a model of smart pill box with alarm and android phone notification by combining the hardware part and software part. It consists of three layer mobile application, server and pill box. The pill box consists of electrical and mechanical components such as servo motors, wire etc. Below shown block diagram is a smart pill box prototype Mobile application is user interface which is used to take information about pill time, date, and schedule and then sends data to server which contains module or programming for functioning of smart pill box. We give power supply to the microcontroller, the microcontroller then controls all the sensors and motors. Real Time Clock (RTC) module to provide the time and date information .We use touch sensor to get feedback from elder when he close the lid of box manually. Next, the output part consists of a LED to indicate from which compartment medicine has to be taken, servo motor is used to open and close the lid of the respective medicine compartment.
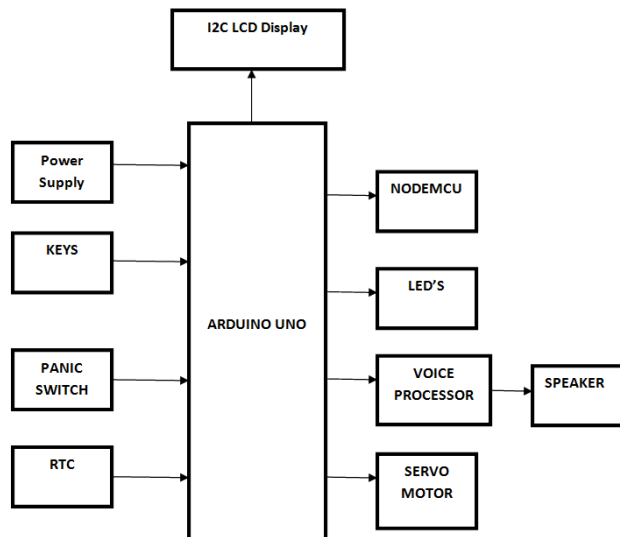

Figure.No.5.1 Proposed System Block Diagram

VI. SYSTEM MODELS

6.1. Hardware Requirements
- Power Supply
- LCD Display
- Ardunio UNO
- Keypad
- Voice Processor
- Speaker
- Servo motor

6.2. Software Requirements
- Arduino IDE
- Embedded C
- Proteus
- Website
- App

6.1.1. Arduino

An Arduino is actually a microcontroller based kit which can be either used directly by purchasing from the vendor or can be made at home using the components, owing to its open source hardware feature. It is basically used in communications and in controlling or operating many devices. The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. TheUno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter. "Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform, for a comparison with previous versions.
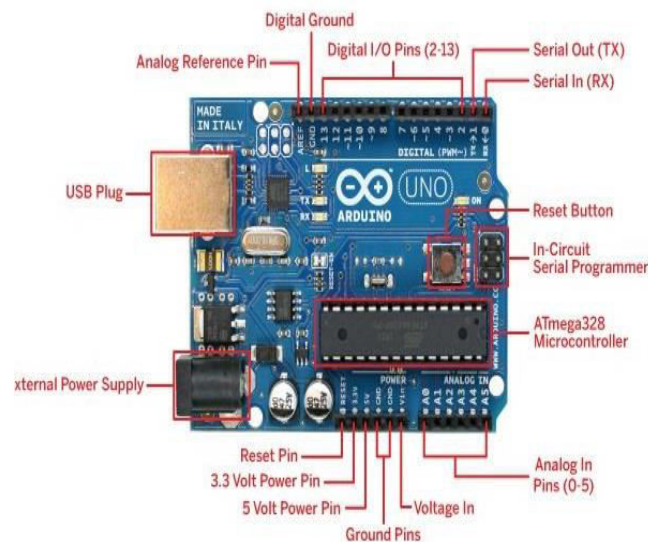

Figure.No.6.1.1. Arduino Board

6.2.1 Introduction To Embedded 'C':

Embedded systems programming is different from developing applications on a desktop computer. Key characteristics of an embedded system, when compared to PCs, are as follows:

- Embedded devices have resource constraints (limited ROM, limited RAM, limited stack space, less processing power)
- Components used in embedded system and PCs are different; embedded systems typically use smaller, less power consuming components.
- Two salient features of Embedded Programming are code speed and code size. Code speed is governed by the processing power, timing constraints, whereas code size is governed by available program memory and use of programming language. Goal of embedded system programming is to getmaximum features in minimum space and minimum time. Embedded systems are programmed using different type of languages:
- Machine Code
- Low level language, i.e., assembly
- High level language like C, C++, Java, Ada, etc.
- Application level language like Visual Basic, scripts, Access, etc.
- Assembly language maps mnemonic words with the binary machine codes that the processor uses to code the instructions. Assembly language seems to be an obvious choice for programming embedded devices. However, use of assembly language is restricted to developing efficient codes in terms of size and speed. Also, assembly codes lead to higher software development costs and code portability is not there. Developing small codes are not much of a problem, but large programs/projects become increasingly difficult to manage in assembly language.

Finding good assembly programmers has also become difficult nowadays. Hence high-level languages are preferred for embedded systems programming.

6.2.2 Proteus

Proteus was initially created as a multiplatform (DOS, Windows, Unix) system utility, to manipulate text and binary files and to create CGI scripts. The language was later focused on Windows, by adding hundreds of specialized functions for: network and serial communication, database interrogation, system service creation, console applications, keyboard emulation, ISAPI scripting (for IIS). Most of these additional functions are only available in the Windows flavor of the interpreter, even though a Linux version is still available.

6.2.3 Arduino Software Installation

Follow the steps to Arduino c installation.

Step1: Visithttp://www.arduino.cc/en/main/softwareto download the latest Arduino IDE version foryour computer's operating system.

Step 2: Save the .exe file to your hard drive.

Step 3: Open the .exe file.

Step 4: Click the button to agree to thelicensing agreement.

Step 5: Decide which components to install, then click "Next".

Step 6: Select which folder to install the program to, then click "Install".

Step 7: Wait for the program to finish installing,then click "Close".

Step 8: Now find the Arduino shortcut on your Desktop and click on it. The IDE will open up and you'll see the code editor.

Step 9: Open new file

Step 10: Type entire program on the new file then save the file in arduino extension.

Step 11: Run the program and view the output details.

VII. EXPERIMENTAL RESULTS

We made our project as useful for the patient who needs this and all related users. We conclude result that our project is useful for those people who are taking pill regularly, prescription of medicine is very long and hard to remember for those users. Our product is so useful that it can cure those patients illness and there will no need of taking care of these types of patients so caregiver has no tension about their health and they will live healthy and tension free life.
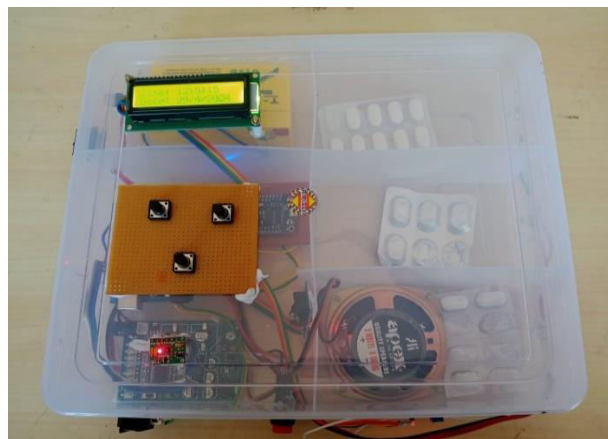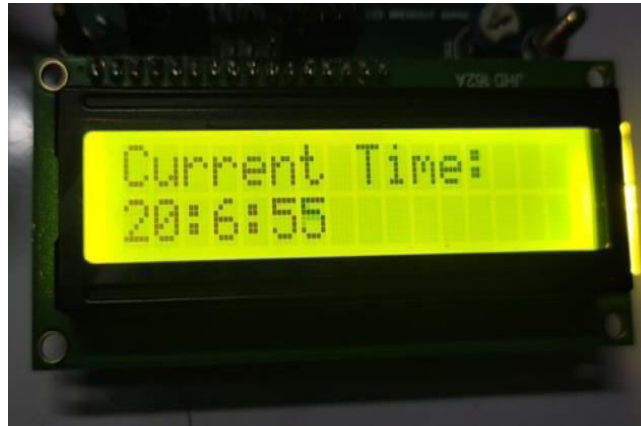

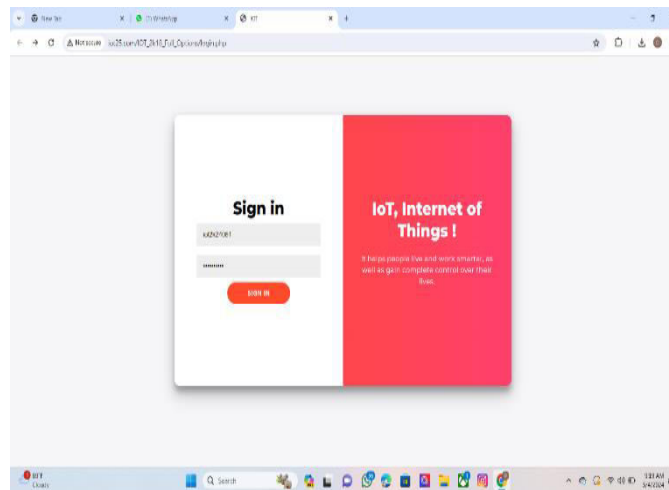**Figure.No.7.1. Hardware kit**

Figure.No.7.2. Timer Set

Figure.No.7.3. Website Login
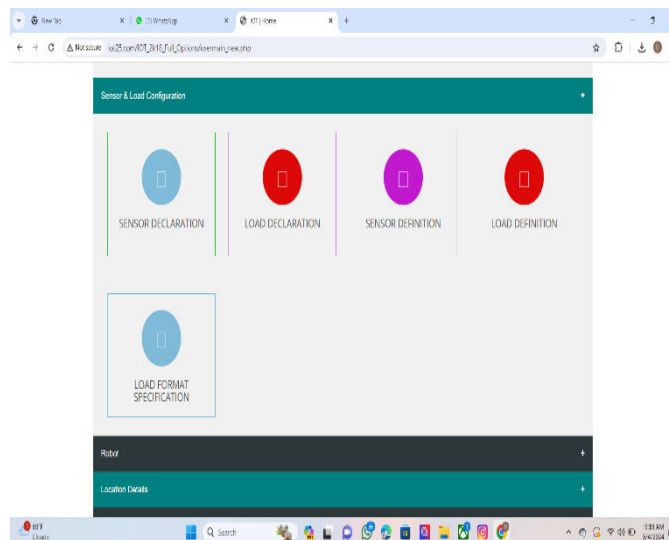
Figure.No.7.4. Configuration Page
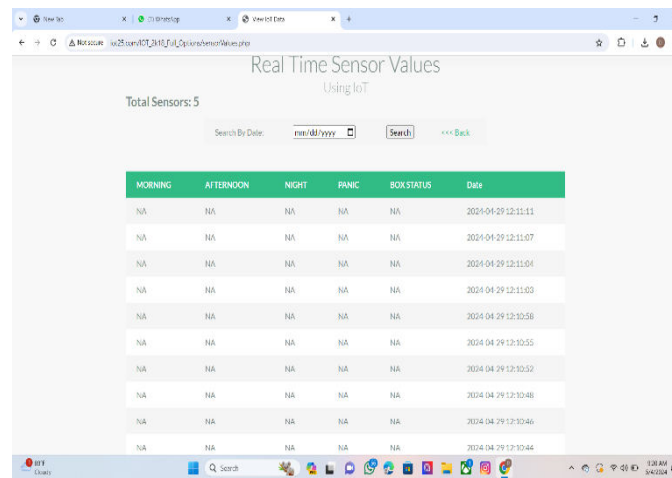
Figure.No.7.5. Data Stored in Website

VIII. CONCLUSION

After completion of this project we will ensure that the problem of not taking medicine will solved. It is specially used for elder peoples who are not able to take medicine on time. The IoT-based smart pill box and health monitoring voice alert system offer a revolutionary solution for medication management and health monitoring. By integrating IoT technology, it provides real-time tracking of medication intake, sends reminders, and offers voice alerts for crucial health parameters. This innovative system not only enhances medication adherence but also empowers individuals to take control of their health proactively. With its seamless integration into daily life and proactive health monitoring features, it represents a significant step towards personalized and efficient healthcare management.

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