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An IoT Based Medication Reminder and Health Monitoring System

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Abstract-- *A major public health issue that affects the entire world is medication non adherence, which has a negative impact on health outcomes and raises healthcare expenses. One of the most frequent causes of unintended pharmaceutical non adherence is forgetting to take medications. For people with diabetes, HIV, cancer, and other chronic conditioned patients require easy method of consuming medicines because number of medicine count will be large and there will be a chance of ambiguity and forgetting. This issue might be resolved with the use of daily prescription reminder systems, such as text messages, automated phone calls, and audiovisual reminder devices but only reminding the medication would not be so effective due to ignorance by the patient. This paper aims to build both of hardware and software model combined together to make ease access of medicines available to the elderly people because they might feel difficulty in using smartphone based reminding system and this module is designed such that the medicine has to be consumed by the patient because there is a buzzer system installed that keeps ringing until the medicine is taken out and it also includes the design of health monitoring based on pulse rate and oxygen level of a patient. There will be an emergency button on the device that notifies the care taker and the doctor.*

Keywords: Medication Reminder, Racks, Arduino Uno, IoT.

1.INTRODUCTION

Elderly people suffering from different diseases need to consume proper medicines in the regular time slots and in many houses the youngsters would not be present all the time to take care of medicines that need to be consumed by the elder ones [1]. If the medicines are not consumed in the right time-slots then medicine may not act accordingly or it may cause an adverse effect on their body. Hence there is a need for the Medication Remainder System that reminds the old people to consume the proper medicine by opening the respective racks containing the medicine which needs to be previously arranged in specific order with proper labeling. This paper is an IoT based Medication Reminder System, it is proposed to facilitate medication adherence. The UI allows the user to feed date and time on which the medicines need to be consumed it also allocates a unique number to the rack or box that is needed to access and there will be an alarm system that goes on ringing until the medicine in the box is taken and the box is closed. The racks are arranged in the form of rows and columns with proper labeling either with medicine names or the positional values. Medication Reminder System reduces the dependency of old people on younger generations. The

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National Council for Disability (NCD) has given a data that at the age group of 65, more than 90% people depend on medication and it is found that many people are facing the problem of missing the medication courses [1].

The primary objective of this work is to provide a user-friendly interface for setting Time, Date, and Medication Allocation in an Appropriate Rack without Discrepancies. The ringing buzzer system that alerts elderly people to take the medicine from the rack. The working model must allow the users to change the medication timings at run time. Hardware racks needs to be implemented that opens and closes automatically through the motor controlled by microcontrollers. The working model will show available medications in each rack and alert the user to any medication shortages in the system connected through Node-MCU. A meta-analysis shows that medical reminding system encourage the adherence have boosted for 4–11% in effectiveness [6]. The design would use

2. METHODOLOGY

The system is set up with the ability to use individual racks to locate the appropriate medicine. The racks are arranged in rows and columns Figure.1 where each rack is assigned a unique value to identify the medicine. Figure.2 shows the labeled racks connected to the microcontroller and LED lights are mounted to each rack to indicate whether the rack is open or close. LED lights can also be used to indicate the user regarding Shortage of medicine, this can also be indicated through Mobile Application or PC. The Arduino Uno is connected to the components and also connected to the racks that are driven by microcontroller-controlled motors. Each rack has the medication's name on it. As an illustration, R1C1 is labelled with Crocin and R3C3 with Dolo 650. These designated racks are controlled by the assigned id values. The designated rack will open at the designated time, dispense the prescribed medication, and activate a buzzer that will ring continuously until the rack is manually closed. For individuals who consume more medications with less uncertainty, this system is operated with numerous racks. The smartphone sensors to assess oxygen level and pulse rate, two crucial parameters for a patient so that the doctor can keep an eye on them and intervene right away if he notices any abnormalities with their heartbeat or oxygen level. Health monitoring system that receives and process pulse rate through pulse rate sensor and displays oxygen level through oximeter sensor both are integrated on the board or Desktop application lets you set the medicine and rack time for the alarm.

R1C1	R1C2	R1C3	R1C4
R2C1	R2C2	R2C3	R2C4
R3C1	R3C2	R3C3	R3C4
R4C1	R4C2	R4C3	R4C4
R5C1	R5C2	R5C3	R5C4
R6C1	R6C2	R6C3	R6C4

Fig 1: Arrangement of Racks

Fig 2: Automated Racks

For the health monitoring section the sensors will continuously track the body and gather information like the oxygen levels and pulse rate over time. The database will be updated or filled with all of this information. The microcontroller will manage the other actions. The caretaker, on the other hand, has access to this information via his computer or smartphone.

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The medication system consists of several components and each component is connected to Arduino Uno board. The build model of Medication Reminder System and Health Monitoring System is discussed using Figure.3 and the steps of the project is followed as

1. The Time and Date for medication and health monitoring is stored in the read only memory.
2. With the help of RTC the current date and time information is gathered.
3. The device continuously matches the current time with the medication. If the match occurs then
4. The buzzer sound will be initiated by opening the respective rack including medicine labels and enables the sensors to take readings of Pulse rate and oxygen levels.
5. If the medicine from the rack is taken then rack closes automatically by stopping the buzzer sound else the buzzer sound will be kept ON.
6. If the readings for the pulse and oxygen is given by the patient then buzzer sound stops else it continuous beeping.
7. When the patient finds uneasiness there will be an emergency button on the device that directly sends the emergency information to the concerned people.
8. Health monitoring system monitors the health of a patient by sensing pulse rate and oxygen level at a specified time.

Process Flow is shown using the Flow Chart in Fig 4.

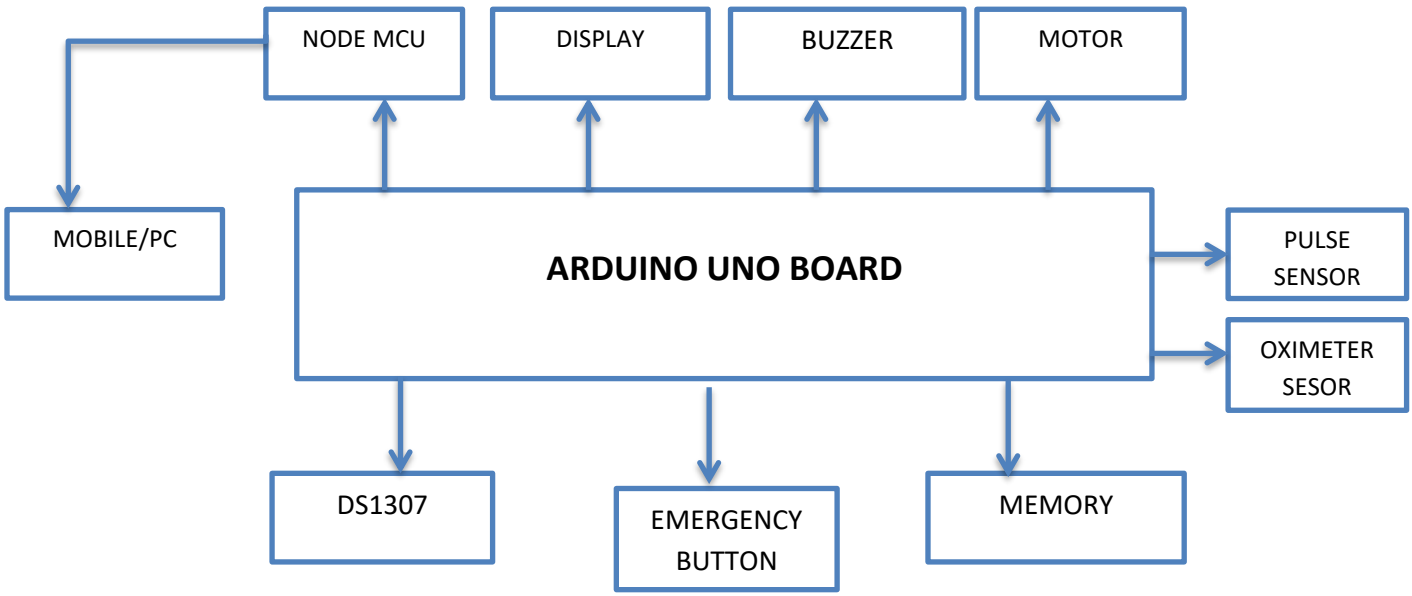

Fig .3: Block Diagram of Medication Reminder System

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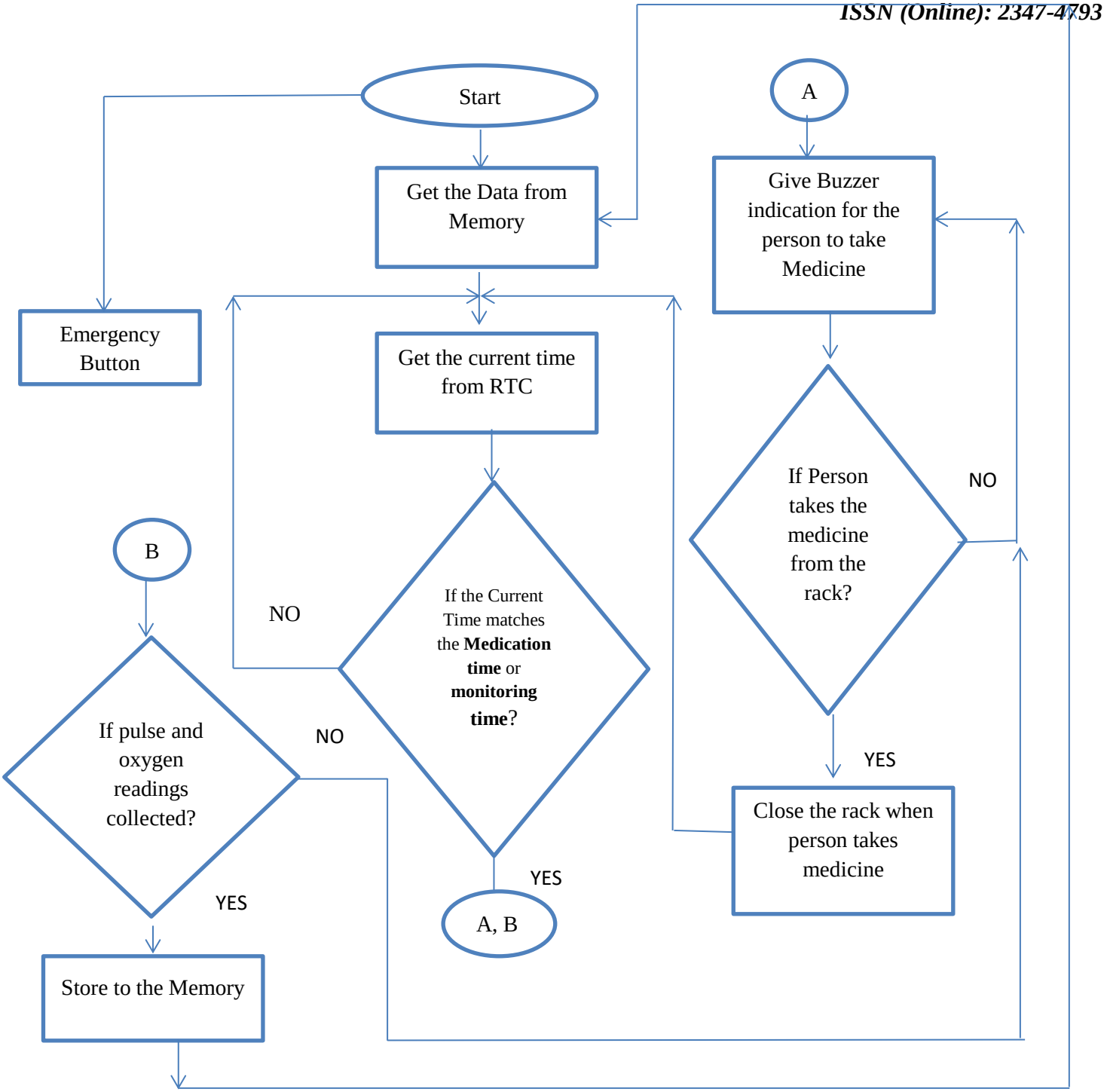

Fig 4.Flow chart of Process Flow

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The algorithm for Medication Reminder and Health Monitoring System is as Follows:

Step 1: If (Emergency! =true) Then

Step 2: Get the current time from RTC

Step 3: if (Current Time == Medication Time) OR (Current Time==Health Monitoring Time)

Step 4: While (Medication Time==True) then buzzer ON until rack closes.

Step 5: While (Health Monitoring Time==True) then buzzer ON until readings are stored.

Step 6: else Notify Emergency==True.

The Medication Reminder System uses following components:

Arduino Uno:
A low-cost, adaptable, and simple-to-use programmable microcontroller board that is available for use in a range of electronic applications. This board can control relays, Lights, servos, and motors as an output and can interact with other Arduino boards, Arduino shields, and Raspberry Pi boards.

Pulse sensor:
When a finger is placed on a pulse sensor, an analogue output of the heartbeat is produced. When it begins to function, the LED on the top side will begin to blink with each heartbeat. The output pin of the sensor is linked to the controller in order to view the output.

Oximeter sensor: It is an optical sensor that obtains its readings by first emitting two wavelengths of light- a red and an infrared one from two LEDs. Then, it uses a photo detector to measure the absorbance of pulsing blood. The data reading performance of this specific LED color combination through the tip of the finger is improved.

Node-MCU:
It is an open-source firmware and development kit that helps to provide communication between the Medication system and mobile application or PC.

DS1307: The Real-Time Clock (RTC) module used to record the current time.

LED Lights:
Light Emission Diodes are used in racks to indicate whether the rack is open or closed.

DC Power Supply:
A device that generates and supplies a steady Direct Current.

Buzzer:
Buzzer is used to indicate the people through some sound.

Relay Boards:
Relay boards are used to control voltage levels and lighting controls.

9. CONCLUSION

In this paper, we have discussed about Medical Reminder System as a real time system that helps the elderly people to take their medicine on time. It will help them get self-dependent. Through this System one can maintain their regular routine without fearing to forget the medicine consumption. This model not only reminds the user to take medicine but also stimulates them to take up the medicine by motor controlled racks and buzzer sound.
An experiment with real users will be one of the following phases to validate our system's functionality and usefulness. Because of unusual user behavior or environmental factors, we anticipate that actual use cases will be more complex than we expected. This will enable us to examine or enhance our system. According to the study, receiving medicine reminders and paying attention

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to them will disrupt their life more than help them. This suggests future plans for the project that reduces human intervention to reminding system. Along with the medicine reminding functionality the project also comprises of health monitoring system that monitors the health regularly and stores in the memory. If any variations in the health concerns it can be identified very easily and can be able treat as early as possible and it also embedded with an emergency button that makes patient to notify concerned persons immediately.

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