The Therapeutic Robots

Shilpa K.A[1*], Twinkle P[2], Uma G.N[3], Vedashree C[4], Vedashree D[5]

[1,2,3,4,5]School of C&IT, REVA University, Bangalore, India

Corresponding Author: shilpa.kadbur@gmail.com

Abstract—The therapeutic robotsmeets the needs of the market by integrating electronic technology and network functionality. The interactive robot, which features a particular device that contains embedded sensors in each compartment that not only transmits detected signals when users are taking their pills but also displays the messagestatus back to the LCD screen installed on the robot by displaying details such as time, date, message regarding the intake of the pill along with the buzzer that alerts the patience. This studyuses both hardware and software components which forms the embeded system to implement internet of thing (IOT). The module first interacts with the android application through a wifi module hence creating locomotion in the designed therapeutic robot. After receiving the inputs from the sensors,Arduino will send for text display regarding the intake of the pil on the screen and a timely. Therefore, the elderly staying in their home or nursing home institution can savea lot of time by managing their medications via this proposedIOT system. The smart interactive pill box will be crucial for medical care management for a broad spectrum of patients from disabled to people suffering from amnesia, including the elderly.

Keywords—The Therapeutic robots, *Internet of Things, Arduino,embedded sensors, Wi-Fi route, Pill dispensor*.

I. INTRODUCTION

This system was designed for loading pillsout of the container at the precise time. In todays medical industry time is of the atmost essence, every minute saved is a life saved and the proposed system can be the solution. Rapid population growth has made it more hard to monitor every single patient, and so there is a need to raise awareness about promoting health and well-being or the quality of life will degrade. The issue is how quality care can be provided to those with reduced access to providers. With a combination of sensors and wifi module network an IOT based system to transmitt data from the sensor network to a personal computer or mobile phone. Family members of the patientcan monitor whether the prescribed pills has been taken on time or not to ensure effective health maintenance. This design aims towards a larger spectrum of patience and can serve for personal use or for a large scale medication monitoring in a big institute. Rest of the paper is organized as follows, Section I contains the introduction of the therapeutic robots, Section II contain the related work of our project, Section III contain themethodology with flow charts, Section IV contains results, Sections VI concludes research work with future directions.

II. RELATED WORK

1.Smart Pillbox: Smart Pillbox informs the patient to take medicine at regular intervals and beeps if medicine is unattended but fails to inform visually and in controlling the moment of dispenser.

2.Automatic Pill Dispenser: It works similarly as therapeutic robots but fails to control the moment of a robot and it does not inform the caretaker/nurse if pills are not taken.
In therapeutic robots caretaker can change the timings and can control the moment of robot and he/she is informed when medicine is unattended.

III. METHODOLOGY

The mechanism behind the working of the proposed model includes an integration between hardware and software components. In the software module ardino IDE platform is used for coding. Where the specification of the pin connections and the timings are set. In the hardware module the code is dumped on the arduino mega microcontroller.where the code is dumped serially onto the chip. IR sensors are used which detect whether the medication has been taken or not. An LCD is used to display the status obtained from the IR sensors along with other attributes such as time, date and day. RTC clock is used to display the time and delay the time when the patient clicks on the switch and displays the delayed time on the LCD.Buzeer of 500Hz frequency is used to indicate that its

time to take the pill by taking the readings from the RTC clock and the fixed time mentioned in the code. Nodemcu module is the wifi router used which helps in making the user- experience better by connecting the robot to the users phone.

Nodemcu cannot be directly connected to the arduino chip because it has only one analog pin hence moter drivers are used. For the locomotion a motor is used with 60rp and four wheels are used connected to it. The wifi module is connected to the android application through which the robot is remotely controlled. In the anroid app developed four buttons are used to control each of the four wheels and the combination of these will help in moving the robot to the patients aid. A 12V DC power supply(accuplus++ battery) is used to power the entire robot. A step down motor is used as the arduino module requires only 5V uninterruped DC supply. For the pill dispending part of the system another motor is used which is attached to a rotating system which makes the plate move, blocking and unblocking the pill supply.
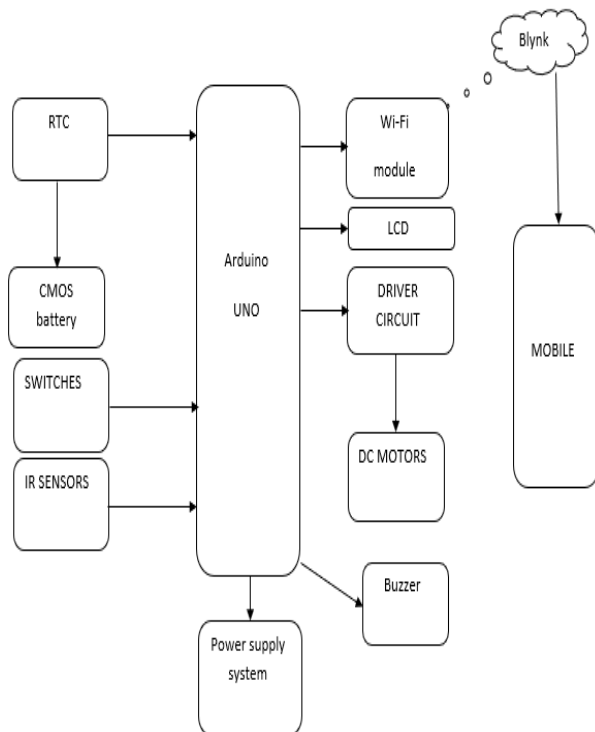

Fig 1: Flow Diagram of Therapeutic Robot

First the code is dumped onto the arduino and the RTC clock timmings are set. The power is suppled from the DC batteries to the motor. The wifi module is connected to the cell phones hotspot and a wireless communication between the robot and the phone is set. Now with the help of this network the robot can be moved towards the reach of the patience by using the buttons provided on the application. When it is time for the patient to consume their medications a buzzer goes on and

the geared motor will unblock the pill supply by rotating the plate attached to the motor. Once the pill is dispensed onto the container and the patient takes the pill the IR sensors sends a positive output to the arduino which inturncommunicates with the LCD and a message telling the "pill is taken" is displayed. If the patient fails to take the pill then the system will wait for a certain interval mentioned in the code and a buzzer will go on. If the pill is still not taken out of the container a message telling "pill not taken" is displayed. This process continues for pill consumtion at different time of the day.

IV. RESULTS

     480
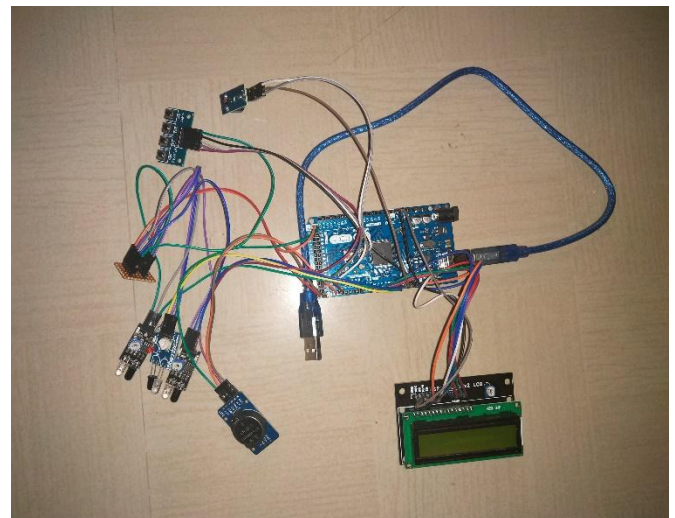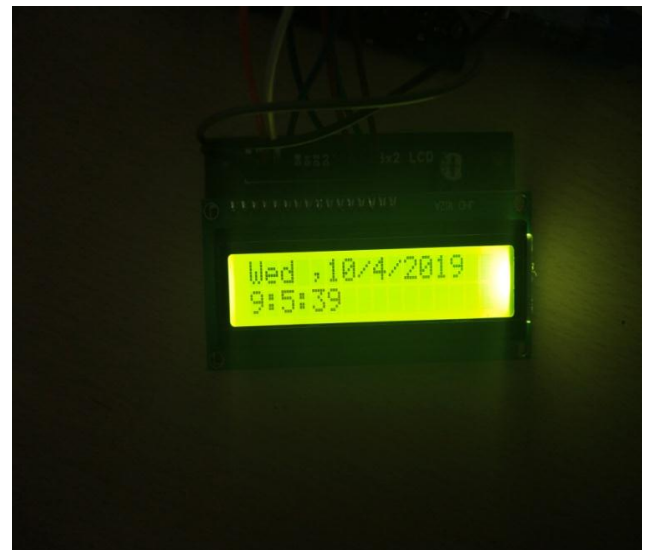
The final design is an inegrated module created for the betterment of the society. This robot saves a lot of time in the medical industry and prevents mishaps that occur due to confusions in the medications prescribed by the doctors. This robots aims to serve a larger society where the focus is on many types of patience. The mobility of this robot gives it a greater advantage over already exsisting models making the therupic robots reliable,protable and easy to use. A liable system as such is a significate contribution to the medical industry.

V. CONCLUSION AND FUTURE SCOPE

The theraputic robot is an integration of hardware and software components which contibutes in making the current medical industry better. Three of the major aspects requred in such a system is provided i,e. mobility, wireless interaction, timmed monitoring making this robot reliable.

Future Scope: This system can be extended to provide different type of tablets to multiple people.A weighing system can be used to obtain accurate information regarding the patients intake of the medicines.Artificial Intelligence can be used to navigate device towards the patients without manually controlling.This robot can be connected to database where the doctor can review and prescribe medicines online,providing easier monitoring.

REFERENCES

[1] Pei-Hsuan Tsai; Tsung-Yen Chen; Chi-Ren Yu; Chi-Sheng Shih; Jane W. S. Liu," Smart Medication Dispenser: Design, Architecture and Implementation"; 2010 September 27; IEEE; 2011; p. 99 – 110.

[2] Suraj Shinde1, Nitin Bange2, Monika Kumbhar3, Snehal Patil;" Smart Medication Dispenser"; International Journal; 2017 april.

[3] Huai-Kuei Wu; Chi-Ming Wong; Pang-Hsing Liu; Sheng-Po Peng; XunCong Wang; Chih-Hi Lin; Kuan-Hui Tu;" A smart pill box with remind and consumption confirmation functions"; 2015 IEEE 27th October; 2016; Osaka, Japan.

[4] Tsai, P. H., C. S. Shih, and J. W. S. Liu, "Algorithms for scheduling multiple interacting medications," Institute of Information Science, Academia Sinica, Taiwan, Technical Report TR-IIS- 08-001, April 2008 Pei Hseun Tseui, "Smart Medication Dispenser: "Design, Architecture and implementation", IEEE journal, Vol-5, March-2011.

[5] Elizabeth Broadbent, Rie Tamagawa, Ngaire Kerse, Brett Knock, Anna Patience, and Bruce MacDonald" Retirement home staff and residents" preferences for healthcare robots", 18th IEEE International Symposium on Robot and Human Interactive Communication, 2009.

[6] A. Sawand, S. Djahel, Z. Zhang, F. Na; Multidisciplinary approaches to achieving efficient and trustworthy eHealth monitoring systems. Commun. China (ICCC); 2014; IEEE/CIC Int. Conf. (2014); p. 187-192.