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A HEALTH-IOT PLATFORM BASED ON THE BIOSENSOR AND INTELLIGENT MEDICINE BOX

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Abstract- IOT based healthcare services have a major potential for automation, let alone the drastic changes that it would bring in the field of healthcare and medicine. With time our life is integrated so much with mobile technologies that we rely on it on multiple occasions. Health care is a major concern for elderly and blind since intake of proper medicine at prescribed time is a challenge and providing services via technologies is a sigh of relief. In this paper, an intelligent health-iot is proposed and implemented, beneficial for blinds as well because of its ability to dispense medicine. It includes an intelligent medicine box (imedbox) comprising of a medicine dispenser with enhanced connectivity, a heartbeat sensor and an android app.

KEYWORDS-Heart-beat sensor, Health-IoT, Intelligent Medicine Box (iMedBox), Medicine Dispenser.

I. INTRODUCTION

The growing technologies and changing lifestyle is the rationale behind the creation of a system that incorporates regular checkups and health care into our busy lives.in a country which is progressing towards modernization exponentially, India holds an enormous population dealing with heart diseases and having minimal time to visit doctors. Our system assists in bridging the gap between healthcare services and time management, providing them faster access to their doctors.it concentrates on a home-centric health care which is convenient for the patients and doctors as hospitals are switching towards remote motorization. Our project focuses on a medicine dispenser which will ensure proper and appropriate dosage dispensed as per prescribed by the doctor. The dispenser will automatically dispense medicine at the time and in amount mentioned by the doctor, thus helping out a lot of elderly and blind people.

In our system an Arduino Uno rev-3 as a microcontroller based on atmega-328 is used which provides an open source and extensible hardware and software thereby saving a lot on expenses. We can add avr-c codes directly in the Arduino programs which provides clear programming and in built libraries in it. A heartbeat sensor is attached to this microcontroller kit which will be at user's side. It works on optical light variation where light is scattered or absorbed during its path through the blood as the heart beat changes.

The main part of the system is the dispenser which is attached to a raspberry pi kit. The raspberry pi-b model has an inbuilt Ethernet and usb ports with a Wi-Fi module. This Wi-Fi module communicates with the android application made available to doctor. The back bone of iot, RFID is used for user identification and authorization along with ZigBee cc2500 used for serial communication between Arduino and raspberry pi. A php based website cum database for our system is developed for information storage and retrieval purposes. The system is integrated with buzzer and speaker on user side for more convenient communication and notification. Thus, the system is developed to promote healthcare services with the use of technologies

II. LITERATURE SURVEY

Geng yang, li xie, matti mäntysalo, xiaolin zhou,zhibo pang, li da xu, sharon kao-walter, qiang chen, lirong zheng in their paper present an iot-based intelligent home-centric healthcare platform which seamlessly connects smart sensors for physiological monitoring and intelligent pharmaceutical packaging for daily medication management[1]. Now a days bio-patch's mechanical and electrical reliability by laminating a thin plastic insulation layer over the patch to protect the conductive traces and exploring new application scenarios for this health-iot platform are open issues to work on.

K.natrajan, b.prasath, p.kokila in their paper describe, how the internet of things is revolutionizing healthcare[2].recent research shows more potential applications of iot in information intensive industrial sectors such as healthcare services.

Gipsa alex, benitta varghese, jenzha g jose in their paper mention patients wanting to consult doctors for consumption of medicine[3].it can be possible to incorporate lcd screens on to the medicine box that could be made as an interface between the patient and the doctor to have a video conference.

P.raga lavima and mr.g.subramanya sarma in their paper talk about ZigBee's potential of transferring sensor values effectively but when there is a need of continuous data transmission ZigBee fails in such cases [4]. Reducing sampling rate solves the above problem but affects the quality of signals.

III. WORKFLOW

I-med Patch:

When a person starts feeling anxious he has to plug the sensor which is attached to the imed patch on his fingertip. The pulse sensor will count the data for a minute and that data will be send to the Arduino (in imed patch) .Arduino Uno is a microcontroller based on atmega328.it has 14 digital input/output pins,6 analog inputs ,a 16mhz crystal oscillator, a usb connection, a power jack , an icsp header, and a reset button. Simply connect it to a computer with a usb cable or power it with a ac-to-dc adapter or battery to get started. The pulse sensor is attached to analog pins in between a0-a6. The data which came from pulse sensor is in analog form so Arduino Uno converts it into digital format. If the pulse rate is lower than 60 or higher than 80 then imed patch will send that data to the imed box which includes raspberry-pi microprocessor through ZigBee cc2500 communication.cc2500 is a fsk /msk transceiver module. It provides extensive hardware support for packet handling, data buffering, burst transmissions, clear channel assessment, link quality indication and wake on radio. RFID transmitter is attached to the imed patch to ensure its usage by particular person only. This radio frequency (rf) transmission system employs amplitude shift keying (ask) with transmitter/receiver (tx/rx) pair operating at 434 mhz. The transmitter module takes serial input and transmits these signals through rf. The transmitted signals are received by the receiver module placed away from the source of transmission.

An rf transmitter receives serial data and transmits it wirelessly through rf through its antenna connected at pin4. The transmission occurs at the rate of 1kbps - 10kbps.

Fig. 1 Arduino Uno

1. Pulse Sensor:

Inside the sensor case, an ir led and a photodetector is placed on two opposite sides facing each other. When a fingertip is plugged into the sensor, it is illuminated by the ir light coming from the led. The photo detector diode receives the transmitted light through the tissue on other side. More or less light is transmitted depending on the tissue blood volume.tsal6100 is a high efficiency infrared emitting diode in gaalas on gaas technology, molded in clear, bluegrey tinted plastic packages.lm324 ic is used as a comparator, when the power is applied to non-inverting terminal which is less than the inverting voltage of op-amp then the output becomes zero and if the non-inverting voltage is greater than the inverting voltage then the output will be high.

I-med Box:

After receiving data from imed patch, the imed box sends that data to the android app owned by the doctor through the Wi-Fi module which is inbuilt in raspberry-pi model b. The raspberry pi has a Broadcom bcm2835 system on a chip (soc), which includes an arm1176jzf-s 700 mhz processor. Raspberry pi model is bundled with on-board Wi-Fi, Bluetooth and usb boot capabilities. RFID receiver (rx) is connected to the raspberry-pi. Whenever user wants to access the imed box the RFID are matched post which the user can access that particular medicine.ht12d decoder is used for decoding the data at receiver it is capable of decoding 12 bits, of which 8 are address bits and 4 are data bits. The data on 4 bit latch type output pins remain unchanged until new is received.

After analyzing the collected data doctor will prescribe medicine to the patient and this prescription will come back to raspberry-pi (which is the part of i-med box) through Wi-Fi. Raspberry-pi will give that data to medicine dispenser as an input and accordingly it will dispense medicine in the prescribed time

Fig 2. Rasberry pi

1. *Medicine Dispenser* :

Medicine dispenser includes motor driver ic l293d it works on concept of h-bridge circuit.
As the data from raspberry-pi come to medicine dispenser, dispenser will dispense one medicine by completing one rotatory motion of motor driver. After taking medicine patient can switch off the buzzer and this will notify the doctor that patient has taken the medicine.l293d is a typical motor driver or motor driver ic which allows dc motor to drive on either direction. L293d is a 16-pin ic. There are 4 input pins for this l293d, pin 2,7 and pin 15 ,10.pins 2,7 will regulate the rotation of motor connected across left side and right input for motor on the right hand side. The motors are rotated on the basis of the inputs provided across the input pins as logic 0 or logic 1.

pin 2 = logic 1 and pin 7 = logic 0 | clockwise direction

pin 2 = logic 0 and pin 7 = logic 1 | anticlockwise direction

L293d for driving the motors has a separate provision to provide motor supply vss (v supply). L293d will use this to drive the motor. It means if you want to operate a motor at 9v then you need to provide a supply of 9v across vss motor supply.

Doctor's Android App:

The data sent by the raspberry-pi is received by the doctor through Wi-Fi and is stored on a website. This android app gives notifications about the patients' health and if any emergency arise then doctor can notify to the ambulance. Doctor gets notification after the patient has taken his medicines. Website is for storage purpose. Doctor can store and retrieve patient's medical history which will be helpful for patient's future prescriptions. Website is built by using php language. This app is secured by a login page at beginning by which only authorized users can access the data stored in website-cum-database. Doctor needs to install this application and always stay connected to the Wi-Fi.

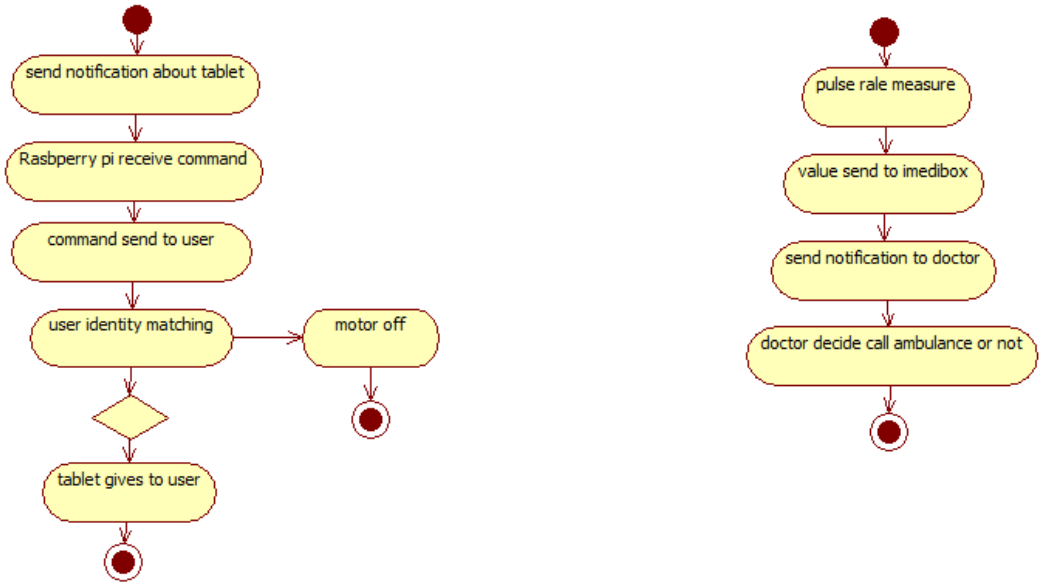

Fig 3. Activity Diagram

IV. FUTUTE SCOPE

The project has the possibility of expanding itself and include multiple ailments in its scope. This would lead to an increase in the number of users and thus appealing to masses. The medicine dispenser designed can also be made to dispense multiple kinds of medicine at a time. Besides this, notifications to doctors via text messages can also be included so that the reliability of an active internet connection is reduced.

V. CONCLUSION

In recent decades, the rapid growing of aging population has been a challenge to global healthcare systems. Many countries have been active in undergoing hospital restructuring through optimizing medical resources and increasing the use of home healthcare IoT now has been recognized as a revolution in ICT and is expected to be applied to many industrial sectors including healthcare. This paper presents an IoT-based intelligent home-centric healthcare platform (iHome system), which seamlessly connects smart sensors attached to human body for physiological monitoring and intelligent pharmaceutical packaging for daily medication management.

REFERENCES

[1] Geng Yang, Li Xie, Matti Mäntysalo, Xiaolin Zhou, Member, IEEE, Zhibo Pang, Li Da Xu, Sharon Kao-Walter, Qiang Chen, Lirong Zheng, Senior Member, IEEE "A Health-IoT Platform Based on the Integration of Intelligent Packaging, Unobtrusive Bio-Sensor and Intelligent Medicine Box".

[2] K.Natrajan,B.Prasath and P.Kokila,"Smart Health Care System using Internet of Things " ,Journel of Network Communication and Emergign Technologies(JNCET) vol 6,issue 3,march(2016)

[3] Gipsa Alex ,Benitta Varghese, jenzha G Jose,"A Modern Health care System using IoT and Android",international Journal on computer Science and Engineering(IJCSE).

[4] P.Raga Lavima and Mr.G.Subramanya Sarma,"An IoT Based intelligent Medicine Box", IJCSMC, vol.4, issue.10, october 2015.

[5] Z. Pang, "Technologies and Architectures of the Internet-of-Things (IoT) for Health and Well-being," PhD Thesis, Royal Institute of Technology (KTH), Stockholm, Sweden, 2013.

[6] S. Li, L. Xu, and X. Wang, "Compressed Sensing Signal and Data Acquisition in Wireless Sensor Networks and Internet of Things," IEEE Transactions on Industrial Informatics vol.9, no.4, pp. 2177-2186, Nov. 2013.

[7] B. Schuz, et al., "Medication beliefs predict medication adherence in older adults with multiple illnesses," Journal of Psychosomatic Research, vol. 70, no. 2, pp. 179-187. 2011.

