

Design and Development of E-Prescription System

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Abstract

Most of the people in the daily life looks for their nearby hospitals to get to know about their health condition. By the proposed model of health monitoring systems an individual or person can get to know about his or her health parameters such as Heart Rate, ECG and Body Temperature in a single device. Here the human body parameters are fetched by the bio sensors, the collected data are forwarded to the controlling unit for further processing of the data. Once the gathered parameters are compared against the required body parameters, if there is any changes it will look up for the required particular medicine in the database then the prescription along with the medicine will be sent to the patient phone number as a message.

Index Terms: *Raspberry Pi 4, ECG sensor, pulse rate sensor, Temperature sensor, RFID*

ThingSpeak Cloud, MongoDB

1 Introduction:

Internet of things is one of the evolving technology in recent days, so we can see many of the devices are connected to the internet, right from head phones and speakers to the edge computing devices for transfer of information or the data to the distant places, even Bio-sensors and other medical devices are working over the internet. To transfer the data not only depends on the speed of the internet but also the processing power of the controller and Processor plays the important role.

Health Care and monitoring plays important role in in human life. Internet of Things combine with the health care reduces the risk of the patients, doctors and care takers. It provides the better results even if physical presence of the patient in the hospital is not there, he or she just has to follow the methodology that how to use the sensor. This system is good for elderly people and smaller children who are more prone to disease and need continuous health monitoring systems. The proposed system is like onetime investment and also to those who stays far in distance from the hospitals and lack of money to visit hospitals again and again. The only thing they need to know is how to use it.

The whole system consists of

1. Bio medical sensors
2. Controlling unit
3. Database
4. Display unit
5. Notification

2 Objective

The proposed model will help the patients to know the state of their health in their resident place even without visiting the hospital. This kind of the system reduce the health care cost as this is onetime investment and there won't be regular visit to the Hospital where we have to pay fees at every time. As each of the patient is provided with their unique ID there won't be any intervention of the other patient message. Our main objective of developing such kind of systems is to deliver better health care monitoring system at a lower cost as much as possible, it will be a very handy tool as it shows data collection of the all the sensors, so it reduces the workload of the patient.

3 Problem Definition

The lack of physical activity in the elderly people and disabled people who can not visit to the hospital every time, so for them this E – Prescription system provides a better monitoring system at their residential place itself.

4 Methodologies

The exist methodology

- **ZigBee based WBAN and Wi-Fi for health monitoring systems [1]**

In here the ZigBee based WBAN consists of sensors like EKG, EEG and Blood Pressure Sensor, transmission of data to the health care centre happens over the Wi-Fi, since the data rate in the ZigBee is low they have developed an algorithm that controls the load in the Wi-Fi network.

- **Detecting Vital Signs with Wearable Wireless Sensors, Received [2]**

In this device the monitoring of Blood Pressure, Blood Glucose level, Cardiac activity and respiratory activity are discussed using wearable health care systems.

- **Advanced Health Monitoring and Receiving Using Smartphone in Global Networks [3]**

In this the IPv6 and Android device is used to get to know the patient heart rate, blood pressure, haemoglobin and temperature.

- **Smart Doctors Appointment and Prescription System [4]**

In this web service is used to connect the Doctor and Patient, without involving of the third party, Doctor will prescribe the patient with list of medicines regarding the illness having.

- **Design and Implementation of a Voice-Based Medical Alert System for Medication Adherence [5]**

Here the alert of the medication is through the voice, tools and technologies such as PHP, TWILLIO REST API, VOICE API are used to alert the patient with regarding their systems.

- **Healthcare monitoring system using Wireless Sensor Network [6]**

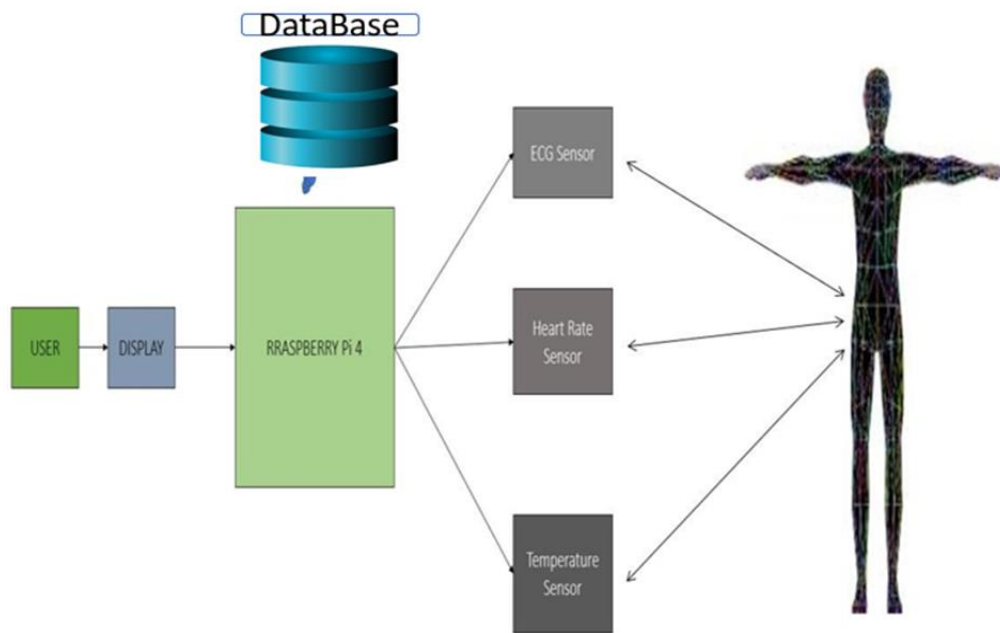
In their study found the design of Wi-Fi sensor network that is capable of monitoring patient's chronic diseases at their home itself via a remote monitoring system. So immersing of wireless sensor technology individual test like only blood pressure, heart rate, temperature etc. can be measured but this research

project enables all this parameter together to be measured under single system, and also thus all can be worn by patient and processed data send toward internet through internet of things(IOT).

5 Proposed Methodology

In this proposed method the wearable devices known as Bio Sensors are used to fetch the body parameters like Heart Beat, Pulse Rate and Body Temperature. Database consists of list of medicines in it, controller as such Raspberry Pi 4 is used for processing up of the data, REST API is used to send the prescription to the patient android device as well as care taker android device.

6 Construction And Working



The whole system includes the components as such.

Controller (Raspberry pi 4) – It is used for processing up of input data from the sensors and sends it to patient as well as care taker

Heart Beat sensor (Silicon Rubber type) – This is a type where a silicon rubber is inserted into one of the finger where the pulse is determined, as these are Analog signals, it will be converted into digital later on.

ECG sensor (AD8232 module) – It determines the activity of the heart an individual there are 3 leads which we have to attach to left of the chest another on right of the chest and last one to the right leg.

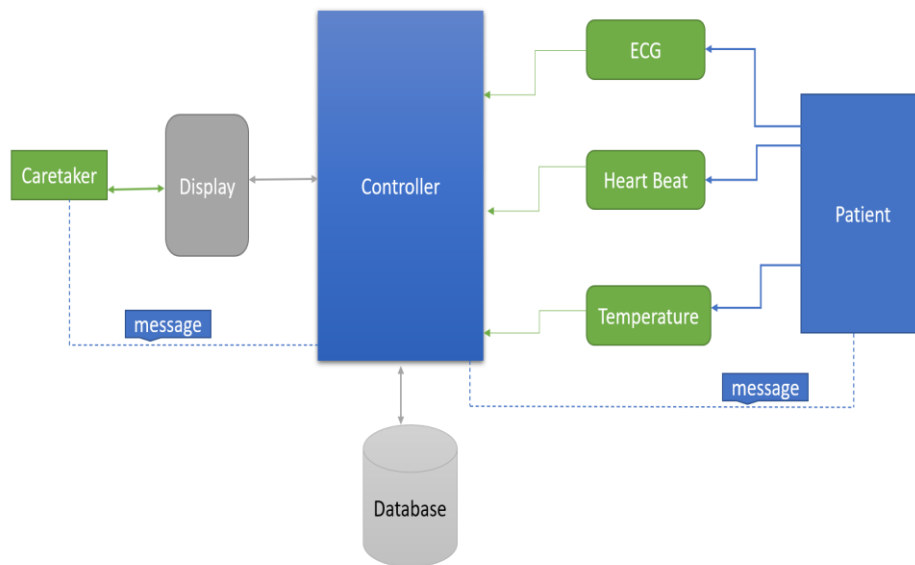
Body Temperature Sensor (DS18B20) – This is the water proof sensor used to determine the temperature of the body.

Database – It is used to store the list of medicines.

Display – PC monitor will be used to show the results.

As mentioned with the above components, they are interconnected with each other, all the sensor is connected the human body as well as to the controller, so the data will be passed from human body to controller in one way, the controller in turn has connection with the database and user via the display.

At the beginning a database, which has information of all the available medicine



Block Diagram

The list of medicines which will be stored in the database, will be fetched by the query method and then it will be sent to patient and caretaker phone number as a prescription.

The patient wears all the bio sensors on his or her body and scans the RFID card so the controller will get's to know which patient is authenticated. Once it is done the bio sensors fetches the Analog readings then converts it to the digital by the circuit these digital signals are send to the controller either by wired or wirelessly.

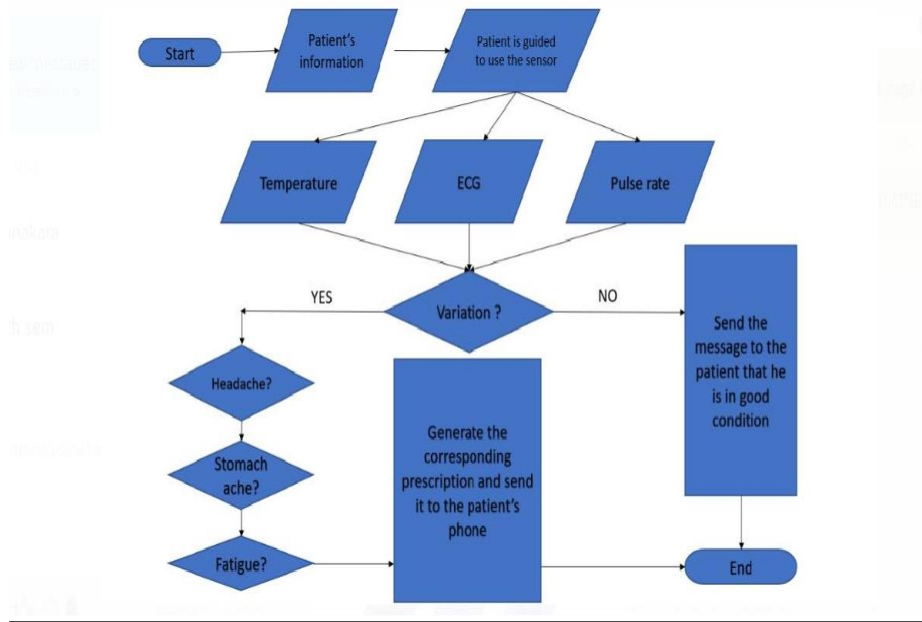
Temperature sensor sense the body temperature.

ECG sensor fetches the Heart activity of an individual.

Pulse rate sensor fetches the pulse activity of an individual.

All the above readings that are fetched are compared against the actual body parameters, if there is no change in readings or variation in the readings, it will alert the patient by sending a message that condition is good. If it is there any change or variation in the readings, patient is asked to enters his or her symptoms like whether an individual has headache or stomach ache or fatigue depending on his symptoms and variation in the readings a prescription will be fetched from the database and send it to the patient as a message, so the patient can get the medicines from the nearby medical shops.

7 FLOW CHART



The above flow chart it clarifies how the process begins and ends.

At first the patient’s information is taken such as name, age, sex and phone number. Then the patient is guided to use the sensors on the body. When the sensors are interfaced with the body, it starts to collect the relevant parameter from the patient’s body. This collected information is sent to the controller through the corresponding channels. The information in the controller is temporarily stored in order to process, upload to the cloud and generate the corresponding prescription to the acquired data. The information gathered is compared with the standard data, which is stored in the database, and if any of the parameter is crossing the threshold, the patient is asked several questions for which the answers needs to be selected among the options. The controller then analyses the data and generates the corresponding prescription, which is sent to the patient’s phone, this prescription can be used to take the medicine in the medical store, thus avoiding the waiting time.

8 Results And Discussion

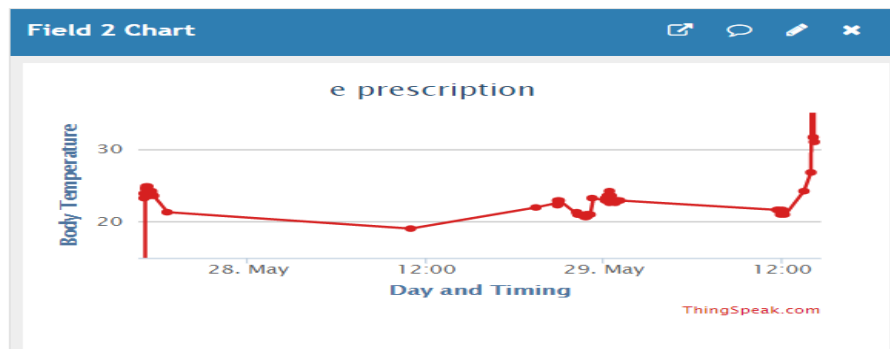


Fig 1 - Body Temperature Graph

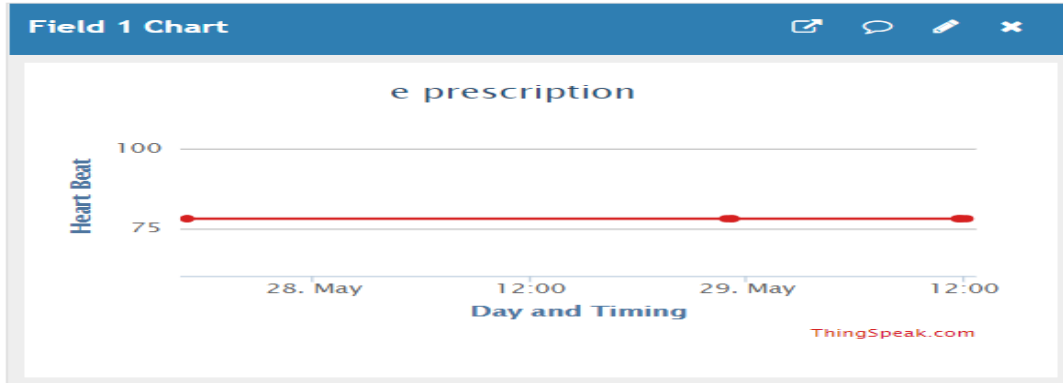


Fig 2 – Heart Beat Graph

```
pi@raspberrypi:~$ mongo
MongoDB shell version: 2.4.14
connecting to: test
Server has startup warnings:
Fri May 29 14:26:34.053 [initandlisten] ** NOTE: This is a 32 bit MongoDB binary.
Fri May 29 14:26:34.053 [initandlisten] ** 32 bit builds are limited to less than 2GB of data (or less with --journal).
Fri May 29 14:26:34.053 [initandlisten] ** See http://dochub.mongodb.org/core/32bit
Fri May 29 14:26:34.054 [initandlisten]
> use medications
switched to db medications
> db.medic.find().pretty()
{
  "_id" : ObjectId("5ecd24a408830edc652f2161"),
  "name" : "Paracetamol",
  "for" : [
    "fever"
  ],
  "year" : 0,
  "month" : 11,
  "type" : "Tablet",
  "dosage" : "0.5 - 1.0 mg"
}
{
  "_id" : ObjectId("5ecd24df08830edc652f2162"),
  "dosage" : "80 - 160 mg",
  "for" : [
    "fever"
  ],
  "month" : 0,
  "name" : "Paracetamol",
  "type" : "tablet",
  "year" : 1
}
{
  "_id" : ObjectId("5ecd24e408830edc652f2163"),
  "dosage" : "80 - 160 mg",
  "for" : [
    "fever"
  ],
  "month" : 0,
  "name" : "Paracetamol",
```

Fig 3 – Medicine Database

```
pi@raspberrypi:~/Desktop/New $ python loka.py
test
RFID NO
3A00190A8FA6
BHARATH
Enter the Age -
22
Place the temperature sensor
Body Temperature .....
(200, 'OK')
(200, 'OK')
Body Temperature is - 37.42 degree Centigrade
temperature is more

Enter - 1 - if you the symptom
Enter - 0 - if you are not have the symptom

Do you have Headache -- 1
Do you have Fatigue -- 0

Medicine for - fever
Medicine Name - Aspirin
Medicine Type - Tablet
Medicine Dosage - 300 mg - 600 mg every 4 to 6 hrs
-----
Medicine for - head ache
Medicine Name - Aspirin
Medicine Type - Tablet
Medicine Dosage - 300 mg - 600 mg every 4 to 6 hrs
-----
```

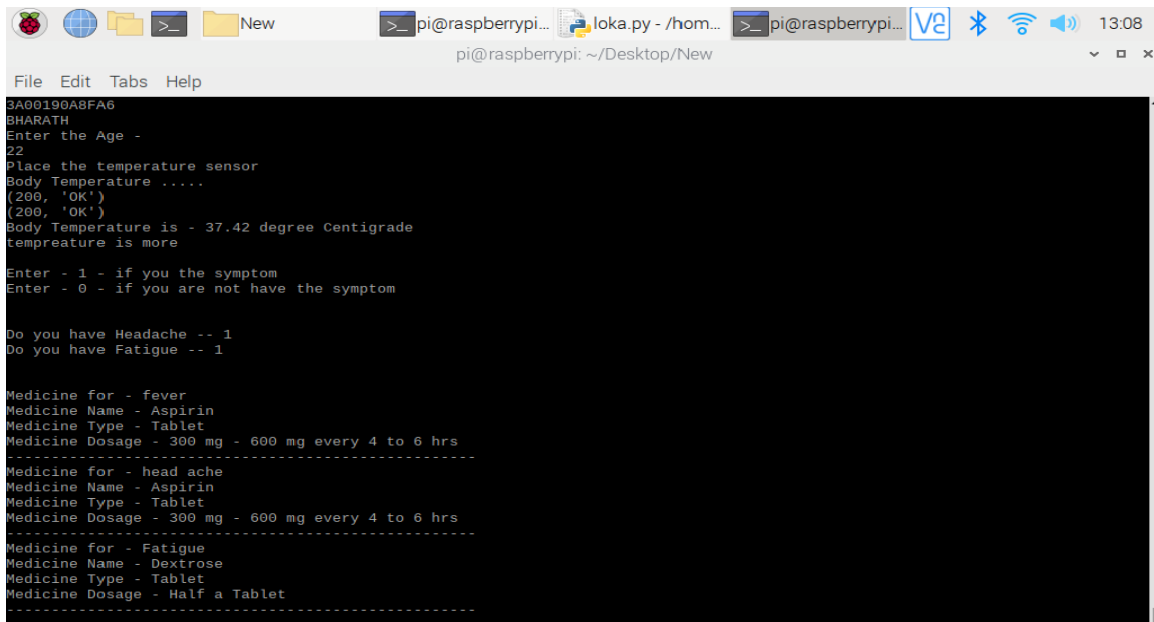
Fig 4 – Output 1

For Body temperature 37.42 degrees Celsius and having headache but not Fatigue. Medicines are **Aspirin** (Dosage to be taken is 300 mg – 600 mg every 4 to 6 hours) for Fever and Headache.

```
Hold The finger On sensor
69bpm
Do you have High BP 0
Do you have Low Blood Pressure 1
Medicine for - Low Blood Pressure 1
Medicine Name - Dextrose
Medicine Type - Tablet
Medicine Dosage - Half a Tablet
```

Fig 5 – Output 2

For the same body temperature (i.e 37.42 degree Celsius), Heart rate 69 bpm and having Low BP but not High BP the medicines are **Dextrose** (Dosage to be taken is half a tablet).



```
3A00190A8FA6
BHARATH
Enter the Age -
22
Place the temperature sensor
Body Temperature .....
(200, 'OK')
(200, 'OK')
Body Temperature is - 37.42 degree Centigrade
temperature is more

Enter - 1 - if you the symptom
Enter - 0 - if you are not have the symptom

Do you have Headache -- 1
Do you have Fatigue -- 1

Medicine for - fever
Medicine Name - Aspirin
Medicine Type - Tablet
Medicine Dosage - 300 mg - 600 mg every 4 to 6 hrs
-----
Medicine for - head ache
Medicine Name - Aspirin
Medicine Type - Tablet
Medicine Dosage - 300 mg - 600 mg every 4 to 6 hrs
-----
Medicine for - Fatigue
Medicine Name - Dextrose
Medicine Type - Tablet
Medicine Dosage - Half a Tablet
-----
```

Fig 6 – Output 3

For the body temperature 37.42 degree Celsius, Aspirin (Dosage is 300 mg to 600 mg for every 4 to 6 hours) is for fever and also headache , Dextrose (Dosage is half a tablet) for fatigue

```
Hold The finger On sensor
72bpm
Do you have High BP 1
Medicine for - High Blood Pressure
Medicine Name - MetaProlol xl25
Medicine Type - Tablet
Medicine Dosage - 25 mg One time in a day for 2 weeks
-----
```

Fig 7 – Output 4

For the same body temperature (i.e 37.42 degree Celsius), Heart rate 72 bpm and high BP medicine is Metoprolol xl25 (Dosage is 25 mg One time in a day for 2 weeks).

Inputs

ID – Bharath
3A00190A8FA6

ID Number –

Age
Yes – 1
No – 0

Output

Body Temperature
Medications for Fever, Headache, Low BP, High BP, Fatigue

Heart Rate

9 Advantages And Application

- It can be used to monitor our health daily
- There is 24x7 availability of the device unlike doctor's availability
- It is cost effective
- This device is portable and easy to handle
- Real time communication is possible
- Wireless routine health checkup possible

10 Conclusion And Future Scope

Today's generation is very negligent towards health and fitness with a small percentage of teenagers succumbing to hearth diseases. Our project aims to monitor the health of the teenagers with accurate results and provide prescriptions to the abnormalities observed along with notification to the caretakers.

Acknowledgment

This paper is based on the automated prescription system, where an individual can get to know about his or her health condition with a lowcost device. We call the whole system as E-Prescription, we provide manual as well as online methods as how to use the device. We all the team members are very thankful to for very best support from our guide and HOD and also for our family members for the financial support.

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