PATIENT HEALTH MONITORING ON WEB SERVER BASED: SUGGESTION PRECAUTION AND VIGILANT SYSTEM

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Abstract : The advancement of the Internet of Things technology is playing a key role in developing the health sector by making it much more accessible and affordable through easy to use applications for virtual and distant interactions with patients. Taking the capability of IoT technology into account, it is possible to overcome the difficulties faced by physically unstable patients in consulting a doctor physically on a regular basis. This work has led to a prototype of IoT Based Remote Health Monitoring System for Patients. This prototype consists of health sensors: heart pulse sensor, body temperature sensor or any kind of sensors. All these sensors were merged together into a single system with any microcontroller. The data acquired from the sensors is shown on text file or database. An Android phone also these data can be shown. The data also be sent on Google Drive or Cloud. The graphical representation of the health parameters also shown. IoT integrated with the health wearable's can overcome the need of visiting hospitals for primary health issues. This also reduces the medical expenses for patients significantly. In addition, the doctors can prescribe necessary medications by observing the patient's health stats over time through an application. Detailed analysis of the signals was obtained with respect to variations in physical and environmental activities to understand the functioning of the sensors used.

IndexTerms -. IOT, WHMS, BSN, BS, ,WSN,CLOUD

I. INTRODUCTION

Wearable health-monitoring systems (WHMS) have drawn an IOT of attention from the research community and the industry during thelast decade as it is pointed out by the numerous and yearly increasing corresponding research and development efforts [8],[14],[15]. Easier life with the help of developing technologies is the trend of the day. Human and Computer interaction has become an increasingly importantpart of our lives because of immense technological infusion into our lifestyles. Today, many patients have to be bed ridden because of massive machine which are attaching body for continuously monitor patient health. Costing of instruments which are used by hospital for monitor patient health are so high. So, charges acquired by hospital are increased by thousands and lacks. As healthcare costs are increasingand the world population is ageing [10], there has been a need to monitor a patient's health status while he is out of the hospital in his personal environment. To address this demand, a variety of system prototypes and commercial products have been produced in the course ofrecent years, which aim at providing real-time feedback information about one's health condition, either to the user himself or to a medical center or straight to a supervising professional physician, while being able to alert the individual in case of possible imminent health threatening conditions. In addition to that, WHMS constitute a new means to address the issues of managing and monitoring chronic diseases, elderly people, postoperative rehabilitation patients, and persons with special abilities [14], [15]. Wearable systems for health monitoring may comprise various types of miniature sensors, wearable or even implantable. These biosensors are capable of measuring significant physiological parameters like heart rate, blood pressure, body and skin temperature, oxygen saturation, respiration rate,electrocardiogram, etc. The obtained measurements are communicated either via a wireless or a wired link to a central node, for example, a Personal Digital Assistant (PDA) or a microcontroller board, which may then in turn display the according information on a user interface ortransmit the aggregated vital signs to a medical center. The previous illustrates the fact that a wearable medical system may encompass a wide variety of components: sensors, wearable materials, smart textiles, actuators, power supplies, wireless communication modules and links, control and processing units, interface for the user, software, and advanced algorithms for data extracting and decision making [9].

II. LITERATURE REVIEW

In the past existing strategy PC gadgets utilized as information procurement (DAQ) frameworks we can gather imperative data about the oldpatients remotely. Existed framework which screens temperature and heartbeat pace of various patients and prompt move is made utilizing Bluetooth innovation. The Mobile Hub has numerous appealing highlights less expensive value, compact, area mindfulness, inbuilt touch screen , anyway on the opposite side it has likewise huge constraints contrasted with a full PC equipment like restricted CPU control, memory, stockpiling size and outside interface association support, The Mobile Hub is focusing on various functionalities contrasted with the Home Hub arrangement because of the littler screen size and less equipment interfaces, and it can expand the ease of use with extra extraordinary highlights, for example, versatility, area mindfulness and little size. Portable Hub programming is skilled to run practically all Bluetooth empowered and Android based Smartphone. In an unexpected frenzy circumstance an alert can be initiated physically (by the patient) or naturally (by for example the accelerometer) with the cell phone. At the point when an alert sign started the focal dispatcher can gain area data (in

light of GSM/GPRS cell data) promptly [1]. Recently, several IoT systems have been developed for IoT healthcare and assisted living applications. A multiple communication standard compatible IoT system for medical devices was designed by Wang et al. in[8]. Xu et al. proposed a resource-based data accessing method (UDA-IoT) that is suitable for healthcare information-intensive applications [4]. Kolici et al. proposed and implemented a medical support system considering Peer-to-Peer (P2P) and IoT technologies. They used a smart box to control the situation of patients. Moreover, they performed several experiments to evaluate the implemented system for few different scenarios [5]. Sandholm et al. proposed an on-demand Web Real-Time Communication (WebRTC) and IoT device tunneling
service for hospitals. The proposed system relies on intercepting key parts of the WebRTC Javascript Session Establishment Protocol (JSEP)and using local network gateways that can multiplex traffic from multiple concurrent streams efficiently without leaking any WebRTC trafficacross the firewall except through a trusted port [6]. An acquisition and management of biomedical data using IoT has been proposed by Antonovici et al. They developed an Android application that aims to record the data measured (SBP-Systolic Blood Pressure, DBP - Diastolic Blood Pressure and Heart Rate) by the electronic sphygmomanometer that communicates via Bluetooth. The proposed system offers the possibility of transmitting medical data using any mobile device. Data will be compared with the normal values and when an abnormality is observed, the patient is notified. In the worst case, the emergency service and doctors will be notified as well. The patient with vision impairment who are suffering from diabetes, hypertension or obesity is also supported by adapting a “Text To Speech” engine that allows data to be transmitted as type string to the device [7]. Krishnan et al. presented a real-time Internet application with distributed flow environment for medical IoT. If the patient is out of range for the Wi-Fi, or the server is unavailable, the patent’s data will be stored locally and sent to the server when the patient arrives back in range of connectivity [3]. Azariadi et al. proposed an algorithm for electrocardiogram (ECG) signal analysis and arrhythmia detection on IoT-based embedded wearable medical platform, as suitable for 24-hrs continuous monitoring. A Galileo board is used to implement the design [2].

III. SYSTEM DESIGN

3.1 LM35 Temperature Sensor

- LM35 is a temperature measuring device having an analog output voltage proportional to the temperature.
- It provides output voltage in Centigrade (Celsius). It does not require any external calibration circuitry.
- The sensitivity of LM35 is 10 mV/degree Celsius. As temperature increases, output voltage also increases. E.g. 250 mV means25°C.
- It is a 3-terminal sensor used to measure surrounding temperature ranging from -55 °C to 150 °C.
- LM35 gives temperature output which is more precise than thermistor output.

Figure 1 Pin Details

VCC: Supply Voltage (4V – 30V)

Out: It gives analog output voltage which is proportional to the temperature (in degree

Celsius).GND: Ground

3.2 Tilt Sensor

The tilt sensor module can be connected to arduino using suitable jumper wires. First of all connect the power supply lines; VCC and GND of the module to 5V and GND of the Arduino respectively. Next link the digital output (DO) of the module to digital pin 2 (D2) and analog output (AO) to analog input 0 (A0) of the arduino. The whole hardware should be powered by a 9V DC / USB source through the DC IN
/USB socket of the Arduino board.

Figure 2 Tilt Sensor

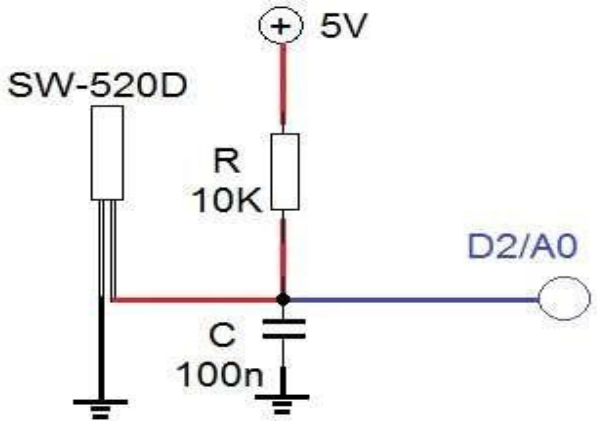


Figure 3 Pin Details

3.3 Pulse Sensor

Pulse Sensor Amped is a plug-and-play heart-rate sensor for Arduino and Arduino compatibles. It can be used by students, artists, athletes, makers, and game & mobile developers who want to easily incorporate live heart-rate data into their projects. Pulse Sensor adds amplification and noise cancellation circuitry to the hardware. It's noticeably faster and easier to get reliable pulse readings. Pulse Sensor Amped works with either a 3V or 5V Arduino. When a heartbeat occurs blood is pumped through the human body and gets squeezed into the capillary tissues. The volume of these capillary tissues increases as a result of the heartbeat. But in between the heartbeats (the time between two consecutive heartbeats,) this volume inside capillary tissues decreases. This change in volume between the heartbeats affects the amountof light that will transmit through these tissues. This change is very small but we can measure it with the help of Arduino. The pulse sensor module has a light which helps in measuring the pulse rate. When we place the finger on the pulse sensor, the light reflected will change based on the volume of blood inside the capillary blood vessels. During a heartbeat, the volume inside the capillary blood vessels will be high. This affects the reflection of light and the light reflected at the time of a heartbeat will be less compared to that of the time during which there is no heartbeat (during the period of time when there is no heartbeat or the time period in between heartbeats, the volume inside the capillary vessels will be lesser. This will lead higher reflection of light). This variation in light transmission and reflection can be obtained asa pulse from the output of pulse sensor. This pulse can be then conditioned to measure heartbeat and then programmed accordingly to read asheartbeat count.

Figure 4 Front and Back View

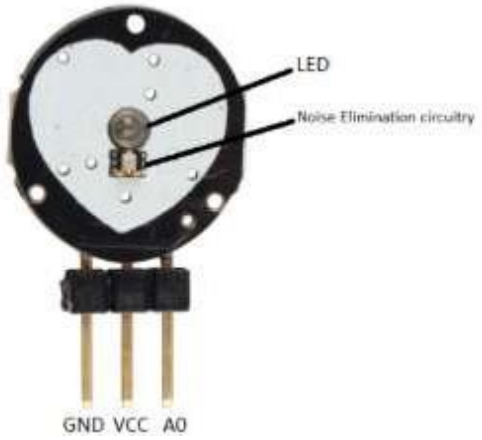


Figure 5 Pin Details

Specification

Diameter = 0.625"

(~16mm) Overall

thickness = 0.125"

(~3mm)Working

Voltage = 3V to 5V

Working Current =

~4mA at 5V

IV. PROPOSED SYSTEM

In this project various medical related sensors we are going to use, to monitor patient. Followings are the steps we are going to carried out.

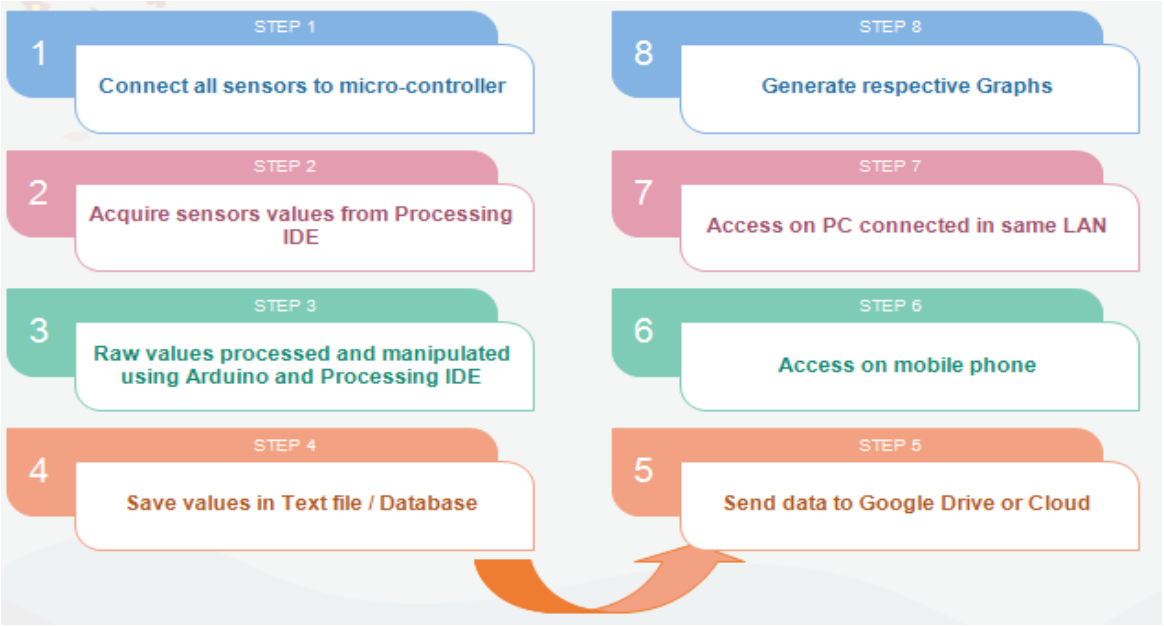


Figure 6 General Flow of Project

Firstly, we are using open source Arduino microcontroller, by using this microcontroller various sensors are attached to it (Here we are using max 2-3 sensors). This sensors provide us various numerical values as per its function, using software the data can be fetched from serial port of microcontroller. The fetched data then processed and will shows the cause of patient. For example if we use Blood Pressure sensor then it will show the BP of patient if its high then it will display on screen that is BP is high. The accessed data will be saved in text file. After saving, data will be sending to cloud or Google Drive. Afterword data can be accessed using mobile and PC but which will be connected to LAN.

The data will not be stored anywhere, only live data can be fetched and display. No database for this system. The data retrieved

from LANonly, so IOT can be achieved. Here we will get offline data only not online.

V. RESULTS AND DISCUSSION

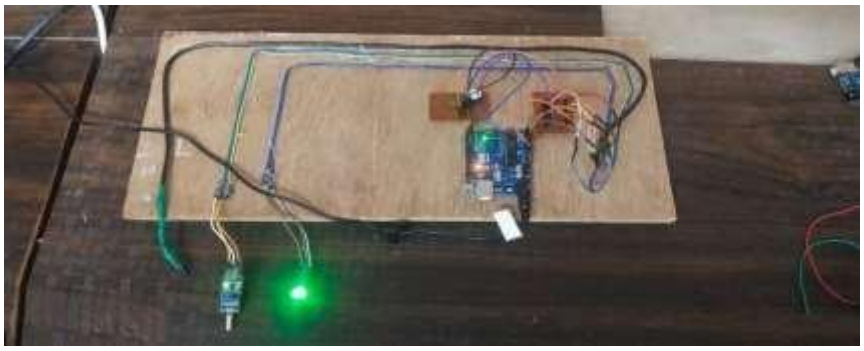


Figure 7 Set up with all sensors

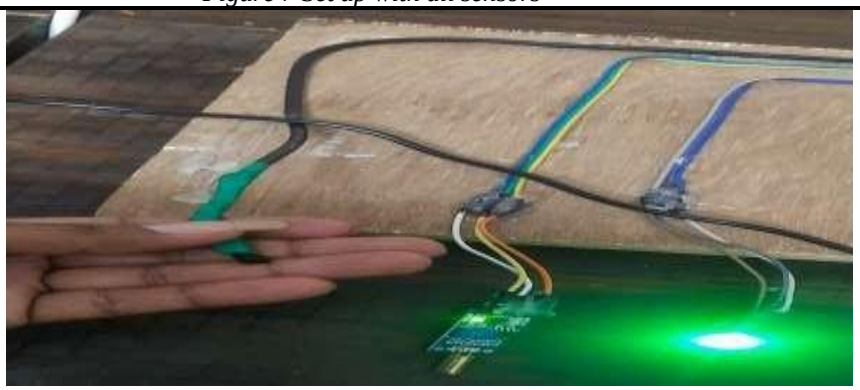


Figure 8 Close view of all sensors

Figure 9 Dash board

This is the dashboard, which contain the live reading of heart beat, temperature and movements, shows values individually. The all threesensors current values also shown. The last ten record also shown. The all data which stored on database also shown.

Figure 10 Live reading of BPM

In this above figure, it shows the live BPM of patient with precaution.

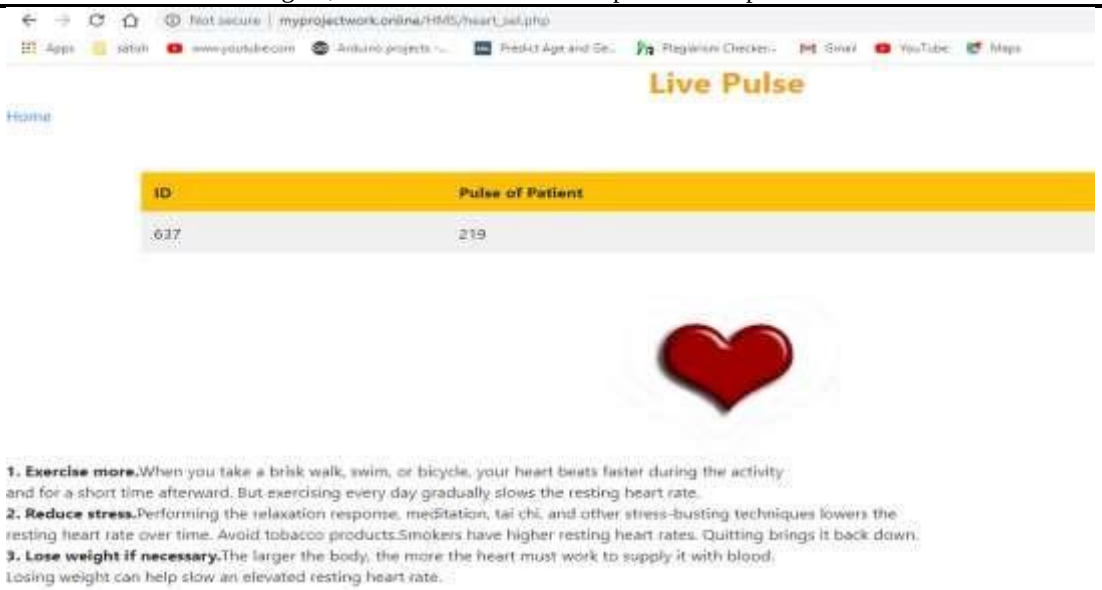


Figure 11 Live reading with precautions

In above figure shows the, if BPM is higher than 150 it shows the precautions should to be taken.

Figure 12 Live reading BPM, if finger not placed properly

In above figure, if finger not placed properly then it shows the error.

Figure 13 No Movement of patient

Above figure shows the movement of body right move or left move if values is greater than 100 then there is no movement.

Figure 14 Movement of patient

In above figure, the move happened, so values is less than 100. It indicates the some movement has been happened. The buzzer will playand notification will go on user in the form of mail.

Figure 15 Notification through E-mail

If patient movement done, then automatically mail will go to user to show notification as shown in above figure.

Figure 16 Human body temperature

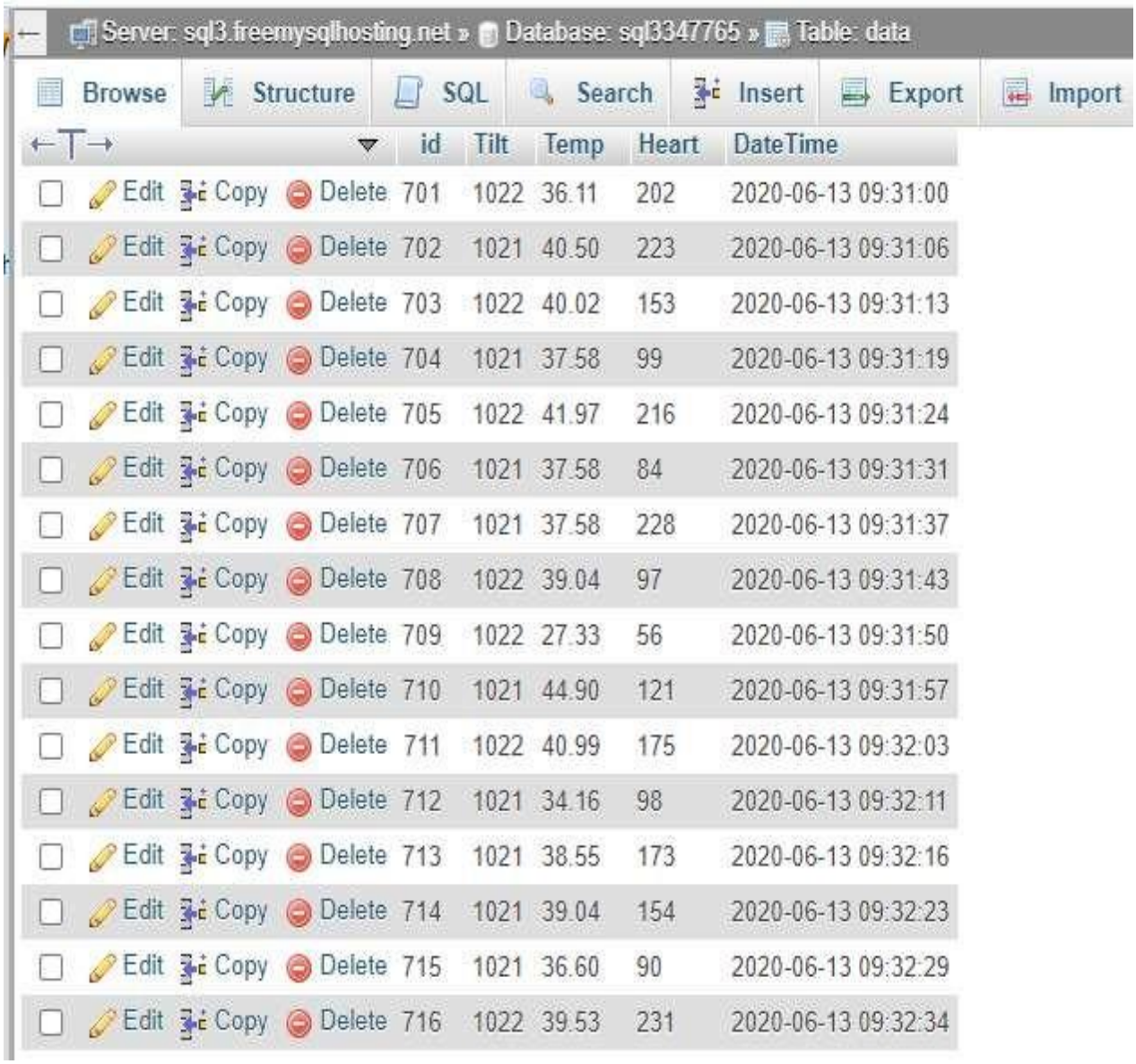
In above figure, the human body temperature shown.

Figure 17 Three sensor live values

All three sensors live values shown in above figure.

Figure 18 All stored data

All fetched data has been shown in above figure. The all data is stored in database. Shown in above figure.



	id	Tilt	Temp	Heart	DateTime
Edit Copy Delete	701	1022	36.11	202	2020-06-13 09:31:00
Edit Copy Delete	702	1021	40.50	223	2020-06-13 09:31:06
Edit Copy Delete	703	1022	40.02	153	2020-06-13 09:31:13
Edit Copy Delete	704	1021	37.58	99	2020-06-13 09:31:19
Edit Copy Delete	705	1022	41.97	216	2020-06-13 09:31:24
Edit Copy Delete	706	1021	37.58	84	2020-06-13 09:31:31
Edit Copy Delete	707	1021	37.58	228	2020-06-13 09:31:37
Edit Copy Delete	708	1022	39.04	97	2020-06-13 09:31:43
Edit Copy Delete	709	1022	27.33	56	2020-06-13 09:31:50
Edit Copy Delete	710	1021	44.90	121	2020-06-13 09:31:57
Edit Copy Delete	711	1022	40.99	175	2020-06-13 09:32:03
Edit Copy Delete	712	1021	34.16	98	2020-06-13 09:32:11
Edit Copy Delete	713	1021	38.55	173	2020-06-13 09:32:16
Edit Copy Delete	714	1021	39.04	154	2020-06-13 09:32:23
Edit Copy Delete	715	1021	36.60	90	2020-06-13 09:32:29
Edit Copy Delete	716	1022	39.53	231	2020-06-13 09:32:34

Figure 19 Data in database

Above figure shows the data stored in MYSQL database. All three sensor values continuously uploaded in database.

Figure 20 Last Ten record

In this above figure, the previous ten record shown.

VI. CONCLUSION

This paper represent the state-of-the-art in research and development for health monitoring systems. As it is revealed by the current technology eminence, WHMS(Wearable Health-Monitoring Systems) have the potential to transform healthcare by providing low-cost solutions, all- day, unobtrusive personal health monitoring and are projected to enable early detection and better treatment of numerous medical conditions as well as disease anticipation and better sympathetic and self-management of chronic sicknesses. However, the current study highlights the detail that there are still a lot of challenges and matters that need to be determined for wearable systems to become more appropriate to real-life situations and also to become acknowledged by patients and other users as a reliable, multifunctional, easy-to-use, and minimally obtrusive technology that can surge their quality of living. The system allows the clinicians to optimize the usage of available medical resources and minimize the costs in monitoring the patients. In the future, we will focus on improving wearing sensor experience by using softer materials and enabling controlled sharing of information among the doctors, the patient, and the patients' family through social networking paradigm.

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