WEARABLES FOR INTERNET OF THINGS FOR HEALTH

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ABSTRACT: ***Now-a-days, Internet of Things (IOT) is an emerging technology for the range of new capabilities. The concept of IOT involves in the situations where the connectivity and computing capability are expanded. These are expanded to objects, sensors, and everyday items that exchange the data without involvement of human. The hypothesis of IOT is to build, operate and manage the physical world by the extensive smart networking, data collection, predictive analytics, deep optimization, machine-to-machine methods, and other solutions. These potential benefits can impact on how individuals live and work. In the near future, corporate and government organizations, may be challenged by the inevitable addition of IOT devices to their networks and connected systems. This notion will serve as a source of innovative decision making.***

Keywords: Raspberry-Pi Microcontroller, Temperature Sensor, Heart Beat Sensor, BP Sensor, AD8232 (ECG Sensor), MEMS Sensor & IBM Cloud.

I. INTRODUCTION

In recent years, wearable technology has made particular progress with millions of devices being sold to consumers and steady advances which are being made in technological capabilities. Al though wearables have benefited from advances in mobile technologies, functionality remains limited compared to smart phones. Additionally, smart phones do not need to be comfortable to wear while in motion, are less restricted by weight and size requirements, and have more well-defined aesthetic requirements. Nevertheless, wearable's present a tremendous opportunity for capturing a continuous stream of data about our physiology and kinesiology, which can empower consumer's with self knowledge.

Human health and fitness are areas in which wearables can offer insights that smart phones cannot. This is evident from the immense popularity of fitness trackers being used by consumers for self monitoring the physical activity. Moreover, wearables are being used for self-monitoring and preventing health conditions such as hypertension and stress. Donald Jones with the Scripps Translational Science Institute says, "My favorite wearables today are those that measure blood pressure and that can be used to impute stress. Hypertension is a reason of many illnesses and stress is obviously a big contributor. Research continues to explore how wearables can help patients and physicians before during, and after medical procedures, such as surgery. Examples such as telemedicine can be performed by on-site paramedics wearing Google Glass, a head-mounted display with a camera and microphone and communicating with off-site medical doctors to provide expert care during disaster relief efforts.

II. LITERATURE SURVEY

Wearables and IOT for health are captured in an interactive e-book format. Here, we produce a brief snapshot of key findings which are related to these novel technologies. As technologists, have a resistant understanding of customer-driven innovation and the actual user benefits of inter connective devices for health will help us engineer better solutions that are more selected to the triple objective of better, faster, and cheaper health solutions.

A progressive improvement in following knee arthroplasty surgery can be observed during walking and transitional activities such as sitting/standing. Accurate assessment of such changes traditionally requires the use of a gait lab, which is often impractical, expensive, and labor intensive. This study employed a recognized protocol of activities both pre-operatively and at regular intervals up to twenty-four weeks post-total knee arthroplasty.

III. WORKING PRINCIPLE

Initially we will connect the DHT11 sensor, Heart Beat Sensor, Blood Pressure Sensor, ECG Sensor & MEMS sensor to the raspberry pi.

DHT11 Sensor will work for the atmospheric temperature we are collecting the temperature from the DHT11 Sensor by using I2C if any changes in the room temperature then it will effects on the resistance of DHT11 Sensor according to that we will get the value in binary which we need to change to the decimal then we will get exact temperature in 0C.

Heart Beat Sensor is worked based on the IR principle we will keep our fore finger into the sensor then it will counts the heartbeat during on time and we need to wait for 60 secs nothing but 1 min in order to collect the heart beat of a human being.

Blood pressure sensor is working on the pressure we are applying we will connect the BP sensor to our hand and start

pumping the pressure then it will give the readings according to our pressure.

ECG sensor is going to connect to our hand and start collecting the max beat of the heart and according to that we will plot the value.

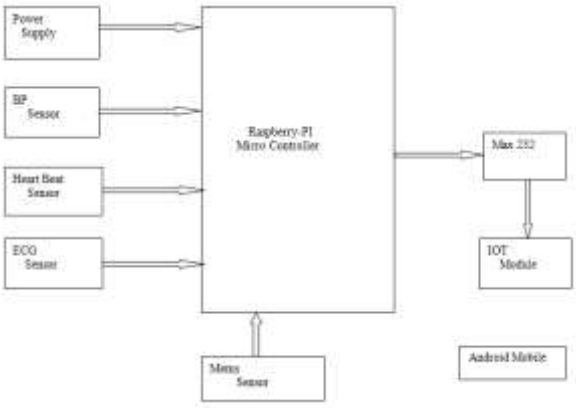

Fig 1. Block Diagram.

MEMS sensor is working based on the change of angle in the motion we will check the max angle change when it is connected to the hand.

After collection of all the parameters from the sensors we will update the same values in the server which doctor can only access according to the parameters the doctor will come to know the patient condition according to that values itself he will pass the prescription to the patient as msg/display.

IV. CIRCUIT ANALYSIS

Regulated Power supply: Generally, the range of unregulated power supply is from 9v to 12v DC. KA8705 voltage regulator IC is used to make a 5v power supply. It is simple for the usage. The positive lead from the unregulated DC power supply is connected to the input pin. The negative lead is connected to the common pin. The output pin can produce the 5v power supply.

Raspberry Microcontroller: A microcontroller is a computer control system on a single chip. It has many electronic circuits built into it, which can decode written instructions and convert them to electrical signals.. As an example of this a microcontroller we can use it to controller the lighting of a street by using the exact procedures.

Now, Microcontrollers are changing the electronic designs. Alternatively, hard wiring a number of logic gates together for performing some function. Now we use the instructions to wire the gates electronically. The list of these instructions given to the microcontroller is called a program. There are different types of microcontroller, this project focus only on the Raspberry-PI Microcontroller where it's pins.

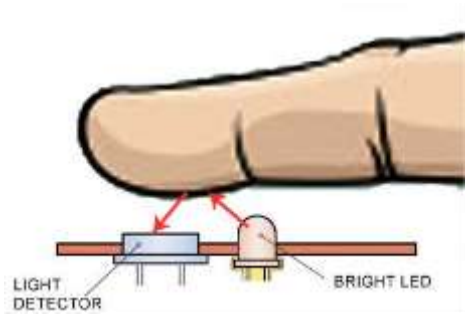

Fig 2. Heart Beat Sensor.

Heart beat sensor: The designing of Heart beat sensor is used to produce the digital output of heat beat when a finger is placed on it. When the heart beat detector is working, the beat LED flashes in unison with each heart beat. This digital output can be connected to microcontroller directly for measuring the Beats per Minute (BPM) rate. It works on the principle of light modulation by blood flow through finger at each pulse

MEMS Sensor:Micro electro mechanical systems (MEMS) are the technology of very small devices. It merges at the nano-scale into Nano Electro Mechanical Systems (NEMS) and nanotechnology. MEMS are also referred as micro machines or micro systems technology – MST.

Fig 3. Mems Sensor.

ECG Sensor: "ECG" redirects here. For other uses, see ECG (disambiguation). Not to be confused with echocardiogram, electromyogram, electroencephalogram, or EEG.

Image showing a patient connected to the 10 electrodes necessary for a 12-lead ECG Electrocardiography (ECG, or EKG [from the German Electrocardiogram]) is a transthoracic interpretation of the electrical activity of the heart over time captured and externally recorded by skin electrodes. It is a noninvasive recording produced by an electrocardiographic device. The etymology of the word is derived from the Greek electro, because it is related to electrical activity, cardio, Greek for heart, and graph, a

Greek root meaning "to write". In English speaking countries, medical professionals often write EKG (the abbreviation for the German word electrocardiogram) in order to avoid confusion with EEG.

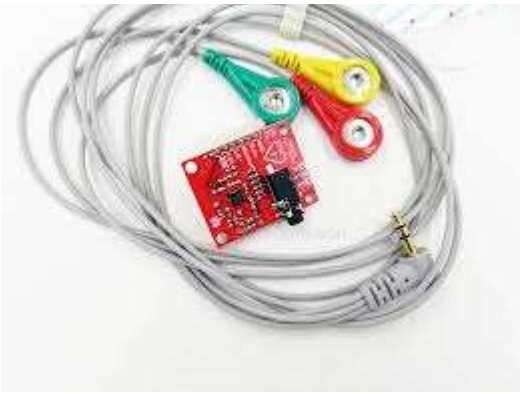

Fig 4. Ecg Sensor.

Fig 5. Blood Pressure Monitoring.

Blood Pressure Monitoring with Analog Data: The force of the blood against the walls of the arteries is known as Blood pressure. Blood pressure is recorded as two numbers. They are the systolic pressure (as the heart beats) over the diastolic pressure (as the heart relaxes between beats). The measurement of a blood pressure is 120/80 mmHg (millimeters of mercury).

V. RESULT ANALYSIS

In this project we introduce a new method for patient health monitoring. In this paper, we use a Raspberry-pi Microcontroller for connecting the sensors like Temperature Sensor, Heart Beat Sensor, BP Sensor, ECG Sensor IOT module Temperature Sensor will calculate the room temperature which is very important for asthma patients whenever the temperature increases more than the room temperature then it will provide a buzzer sound in order to intimate that temperature is increases/decreases. Similarly, we also use Heart Beat Sensor in order to collect the heart rate and also the MEMS sensor in order to check the paralyzed condition or not. After collecting all the information from the patient the microcontroller will send the complete data to the doctor system based on that he will check and finalized the medicine for that particular patient.

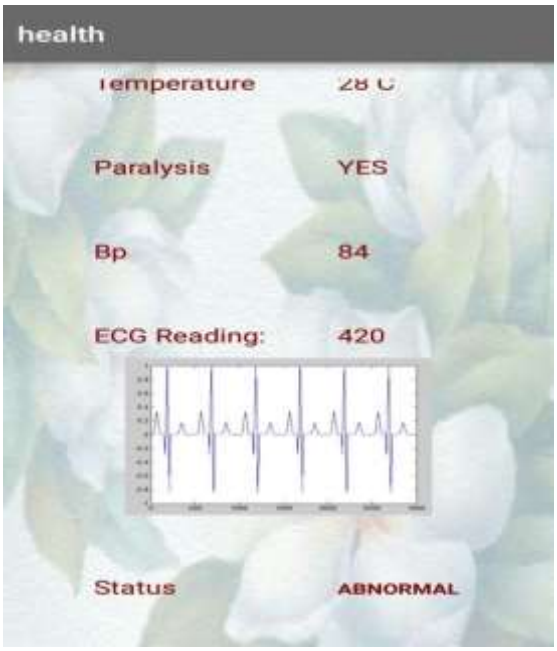

Fig 6. Result Analysis

VI. CONCLUSION

The IOT is a potential emerging solution that contains interconnected devices. This networked device offers better, faster and cheaper customer-driven innovations in health care consumption. In the health care sector, they may be able to measure vital signs without invasive surgery. Embeddables, such as electronic tattoos, may be equipped with sensors that can transmit through wireless technology. Also, three-dimensional printed medical devices are very promising additions to the IOT, in that every object implanted in the human body may be scannable through networks. Similarly, wearable devices that have electrostatic properties connected to various wireless systems could create new user experiences with the added capacity of artificial intelligence, making our future devices truly smart.

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