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Human Body Sensor Health Monitoring System in the Fusion of Iot and Cloud Computing

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***Abstract* – Human body is one of the greatest creations of god. There are certain times where the body condition needs to be checked and monitored continuously or on a timely basis. The exponentially growing healthcare costs coupled with the increasing interest of patients in receiving care in the comfort of their own homes have prompted a serious need to revolutionize health care systems. It can be a normal healthy human or a patient with certain deficiencies; anyone could be taken into account. Here in this project we propose a model where an individual's body parameters are monitored through sensor and the monitored values are then transmitted via cloud to a remote location to a doctor or anyone who is related to the patient. This paper proposed presents a pervasive patient health monitoring (PPHM) system infrastructure. PPHM is based on integrated cloud computing and Internet of Things technologiesIOT sensors are interconnected to a microcontroller and the microcontroller further to cloud is the concept.**

INTRODUCTION

Internet of Things (IOT) allows connected physical objects to communicate via the Internet.IOT is a combination of hardware and software technology that produces trillions of data through connecting multiple devices and sensors with the cloud and making sense of data with intelligent tools. Also, when coupled with IOT, cloud computing can in turn deal with real world things in a more distributed and dynamic manner.

The energy efficient based on World Health Organization's Statistics (WHO) and other sources, improper health monitoring is behind the death of 80% of elderly people (e.g. in Algeria).The greater part of elderly suffers from various diseases. We plan to elucidate on how recent advancement in wireless communication and smartphone technology have empowered tremendous improvement in health monitoring services. To monitor the patient health details in periodic interval is necessary in existing technologies. However, existing works lack flexibility, scalability, aniciency.

We use an IOT based health monitoring system to illustrate typical IOT healthcare system frameworks. This system both personal and physiological observations, sensed with wearable devices on subscribed patients as well as population (e.g., Twitter and a weather service) and public (e.g., CDC and hospital provided) level data, to generate personalized predictive models. The IOT sensors track and stream to the Health provider readings such as heartbeat, temperature, blood pressure. IOT based Health monitoring deploys machine learning and other data mining models, including Semantic Web technology to analyze and identify the status of a patient's condition and recommend cautions or alarm an immediate medical care. In summary, IOT based Health monitoring abstracts health signals from wearable devices and other various datasets, extracts relevant features, and builds personalized health predictive models for its subscribers and authorized researchers/doctors.

A system like IOT based health monitoring involves several parties: the healthcare system provider (i.e., the service provider or SP), patients (i.e., the distributed data contributors or users), medical providers (doctors, hospital staff, and nurses), researchers (i.e., the model/data consumers), and the cloud on which the healthcare system provider may rely for data processing and storage. The aim of this research is to provide a medical monitoring such as the heartbeat, body temperaturefor the individual at any time and any place. Here sensors are used to sense the parameters of the human body, the sensed outputs from the sensors are then sent to the Arduino. The arduino that consists of piece of software and physical programmable circuit board, as per the conditions programmed the control will take the necessary actions such as transmitting the data through anIOT and displaying the measured parameters online. Thus remotely monitoring a person's health condition remotely with the help of modern technologies such as microcontroller and sensors.

RELATED WORK

• Kaleem Ullah,MunamAli Shah [1] [11] This presents the model named as 'k-Healthcare' makes use of four layers, sensor layer, network layer, internet layer and service layer. There are different sensor used like RTX-4100, Arduino, Raspberry Pi, pulse oximetry and smart phone sensors. Communication between layers is done through IEEE 802.15.4, 802.15.6, IEEE 802.11/b/g/n, Zigbee etc. For data storage management the system used cloud storage. The proposed system support different

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protocols and like HTTP, HTTPs, Restful and JavaScript web services.

• Punit Gupta, Deepika Agrawal [2] The proposed system is enough intelligent to monitor the health parameters of patient. In the hardware they used 2nd generation Intel Galileo, a 32-bit Intel Pentium processor system on chip. It is considered as the brain of the given model. As it provides Linux platform with high processing and computer power, it prefers over Arduino. This collects the data from all the sensors which are connected to the patient and upload this data on the web page through Ethernet. Here they used XD-58C pulse sensor for measuring heart beats, it takes +3.5v to +5v at VCC, 50Hz to 60Hz frequency. For temperature calibration they have used LM-35 temperature sensor and Xampp based data base server used for patient's timely record.

• Prosanta Gope and Tzonelih Hwang [3] This paper presents a BSN i.e. body sensor technology. It consists of wearable and implementable biosensors like EMG (Electromyography), ECG (Electrocardiogram), Blood pressure etc. BSN care server used wireless communication using 3G/GPRS/CDMA. Here they mentioned key security requirements like data integrity, data privacy, data freshness etc. To achieve security requirements here they proposed a lightweight anonymous authentication protocol and to get data security requirements, used OCB i.e. offset codebook (OCB) authenticated encryption mode.

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•Abhilasha Ingole, Shrikant Ambatkar [4][12][13][14]this paper based on basic health parameter monitoring without using heavy or bulky system. The credit card size minicomputer placed beside the patient's bed with power and results can see on the screen of computer which is in the same area network. It provides readings of body temperature and heartbeat. For temperature monitoring system used DS18B20 sensor and for heartbeat, it works on the principle of light modulation by blood flow through finger at each pulse. The detected values uploaded on the webpage. This web page created by written the code in HTML. As the Python is user friendly, used to interface different measurement parameters with Raspberry Pi. One can see the actual status of the system on LX Terminal.

• Augustus E. Ibhaze, MNSE, Francis E. Idachaba [5] [15]it is important to measure basic health parameters for aged people often to reduce the risk of ill of falling and dying. So the microcontroller based system is designed to monitor the both heart rate and temperature. This system sends the text message to the mobile phone. When the readings are not normal or increased beyond the threshold level, the device makes used of the sim808 GPRS/GSM/GPS to send the reports of patient's health and the location to a doctor's and caretaker mobile phone. By using Aurduino microcontroller sensors attached to the finger of patient for measuring temperature and heart rate. Also it is designed to recognize the location of the patient. This device takes 9v powered battery.

• Abdullah, Asma Ismael, Aisha Rashid, Ali Abou-ElNour [6] Here authors used Arduino shield to connect different sensors like temperature LM-35 sensor, blood sensor and blood pressure sensor. By using Lab VIEW software one can take reading of different parameters from the patient's body. The updated data displayed on Lab VIEW front panel using Data Dashboard application. This collected biometric information sent wirelessly via ZigBee.

• NgoManh Khoi, Saguna Saguna [7][16][17] this paper proposed as well as evaluated an architecture called as IReHMo. It is capable to operate many types of home automation sensors and health care IOT devices from the sensing layer. For IOT communication protocols such as HTTP, MQTT, CoAP used. CoAP reduced the bandwidth requirements and volume of generated data. It reduces nearly 56% of the required bandwidth for a remote health monitoring system. The author gave qualitative analysis by comparing IOT protocols like HTTP, MQTT, CoAP, and AMQP according to architecture, security mechanism, QoS schemes and communication pattern.

• Won-JaeYi, Oishee Sarkar,Thomas Gonnot [8] This paper presents an architecture of fall detection system paired with the Wireless Intelligent Personal Communication Node(W-IPCN) and Android smartphone is presented. Data received from accelerometer and gyroscopes for falls detection through the W-IPCN. Bluetooth consumes more battery power. To overcome this problem, W-IPCN is introduced. 6LoWPAN is based on IEEE 802.15.4 MAC layer which gives flexibility with another packet switched network like internet. In the process they used one accelerometer on the patient's thigh i.e. ADXL345 and a combination of one LSM303 accelerometer and one L3GD20H gyroscope on his chest. These sensors data can access by W-iPCN to check whether the patient is fallen, lying down, sitting down or upright.

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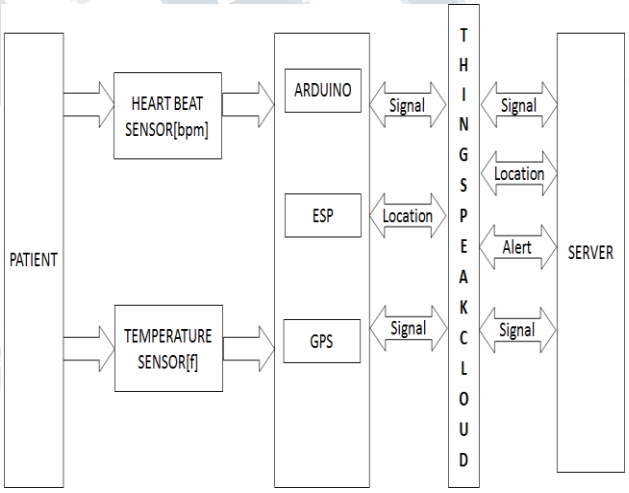
• Sufian Kaki Aslam and Jaffar Umar Thalib Saniie [9] this paper discusses the design flow and an architecture of a Tele-Health observation (THM). It uses effective usage of the computation and different inbuilt peripherals of STM32 microcontroller. This design is classified in three stages namely Biometric Data Acquisition; Data Processing and communication; Notification Panel and User Interface. Here they are using STM32F746NGH6 microcontroller, the discovery board gives Ethernet, 4.3 inch LCD-TFT, MicroSD card, MEMS digital microphone, USB host etc. TFTLCD display has 480x272 pixel size with capacitive touchscreen capability. STN32 platform makes really easy to upload the program.

• Ghulam Muhammad, SK Md Mizanur Rahman, Abdulhameed Alelaiwi, and Atif Alamri[10][18]In this article, as a case study, we discuss the feasibility of and propose a solution for voice pathology monitoring of people using IoT–cloud. More specifically, a voice pathology detection system is proposed inside the monitoring framework using a local binary pattern on a Mel-spectrum representation of the voice signal, and an extreme learning machine classifier to detect the pathology. The proposed monitoring framework can achieve high accuracy of detection, and it is easy to use.

PROPOSED WORK

- The paper that proposed the work of this project is to develop a system that can be implemented with real-time wireless monitoring systems which are designed and implemented through IOT and are able to record and transmit bio-signals of any distinct. The aim of this project is to provide a medical monitoring such as the HEART BEAT, and BODY TEMPERATURE for the individual at any time and any place. Here sensors are used to sense the parameters of the human body, the sensed outputs from the sensors are then sent to the arduino and as per the conditions programmed the control will take the necessary actions such as transmitting the data through a IOT to cloud
- The esp will act as a interface between arduino and Wi-Fi, which used to transfer the sensored data to the cloud. The values are transmitted in the digital form to the arduino and it can be send to the cloud as the same.
- The values are transmitted in the encrypted form by using hill cipher algorithm. In the cloud it send it by the analog wave form.
- The server side viewer can see it in a wave form. We are using think speak cloud and it is a open source cloud. There we are using analytics algorithm. The algorithm which helps to analyze the values of the patient and there we set a threshold value according to the monitoring subject. Then it will gives the alarm while it reaches the upnormal value.
- It used to monitor the patient health in the pervasive manner as well as on demand manner. This will be mainly used for old patients because the major cause of death of old patients will be by due to careless monitor of old patients



EXPIREMENTAL ANALYSIS

Arduino microcontroller is an easy to use yet single board computer. It has gained considerable traction in the hobby and the proffessional market. The arduino is open source. Which means hardware is reasonably priced and development software is free.

Arduino is a single-board microcontroller.Intended to make the application of interactive objects and environments more easier.Basically this is very user friendly. There is a microcontroller unit embedded on it.The code is directly loaded from the computer.

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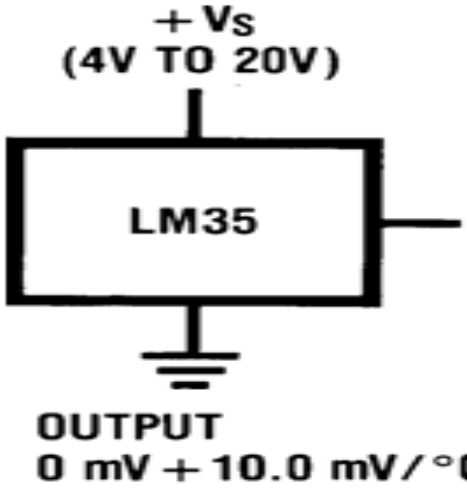
TEMPERATURE SENSOR

- The LM35 thus has an advantage over linear temperature sensors calibrated in Kelvin.
- As the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling.



- The LM35 does not require any external calibration or trimming to provide typical accuracies of ±1⁄4˚C at room temperature and ±3⁄4˚C over a full −55 to +150˚C temperature range.

Heartbeatsensor

The Heart Beat Sensor provides a simple way to study the heart's function.This sensor monitors the flow of blood through Finger . As the heart forcesblood through the blood vessels in the Finger , the amount of blood in the Finger changes with time. The sensor shines a light lobe (small High Bright LED) through the ear and measures the light that is transmitted to LDR . The signal is amplified, inverted and filtered, in the Circuit .

CONCLUSION

we can Monitor a normal human's or a Patient's Health Condition from anywhere at any time. This will save time and cost in the speed moving modern world. We can send patient health parameters like heart beat and temperature to mobile directly.The health monitoring system proposed in this paper is developed to provide much needed patient health history in the real time to the doctors.

The future work of this project states that, it used for automation purpose in the subject of supervised learning. The cloud is the major source for giving the existing records that helps for automation purposes.

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