ISSN XXXX XXXX © 2017 IJESC

Research Article Volume 7 Issue No.5

IoT & Cloud Server Based Wearable Health Monitoring System

Yogita G. Bobade[1], Prof. Rupal .M. Walli[2]
Student[1], Professor[2]
Department of Electronics & Telecommunication
P.R.Patil College of Engineering and Technology, Amravati, Maharashtra, India

Abstract:
Wearable technologies have marked their presence in the world for quite a few years. These wearable devices have a wide array of use like fitness trackers, fashion accessories, media devices, hearing aids, health monitors for specific purposes etc. Similarly cloud computing and internet of things platforms together are paving the way for global intercommunication and data exchange in a fast and secured manner. Wearable technology along with cloud computing and Internet of Things have been implemented in the past for use in medical fields. In this paper we are introducing a new and scalable wearable health monitoring device which we have named as "Blocks". This method makes the device scalable to the needs as per patients' medical conditions. The blocks are detachable and can thus be used in a more précised way for health monitoring and can be accordingly assembled to the patients need.

Keywords: Cloud Computing, Wearable Technology, Remote Healthcare, IoT, Blocks

I. INTRODUCTION

Health Monitoring is an essential part of medical practices to get an insight of the essential health parameters of patients' health. Health monitors as described in [1] are being used in the world from quiet a long period. The paper gives thorough details of standalone systems as well as wearable health monitors typically pulse monitors, electrocardiography monitors, electromyography monitors, invasive diabetic monitors, breathing rate monitors, invasive and non-invasive blood pressure monitors, body temperature, (SpO2), mixed venous oxygenation (SvO2), cardiac output, intracranial pressure, and airway gas concentrations.

The standalone systems as described were bulky and costly which is why only used in hospitals or nursing homes on the bedside. The wearable sensors have seen huge advancements in the recent times. The devices have become compact acquiring small sizes and shapes. These devices can be worn on hand or fingers like rings or necklaces as fashion accessories. Due to their small sizes these devices are now a part of day to day human lives. But these devices are preconfigured with medical sensors leaving no space for scalability and liberty of opting sensors as per consumer/patients requirement.

This in turn impacts the pockets of a normal user. Also this sometimes causes the consumer to buy multiple devices where he spends more money for using different sensors as per his need. Doctors and practitioners require real-time health data of the patients to diagnose and analyze his health conditions. Some health devices have been integrated to work with cloud based platforms like the one explained in [2].

II. LITERATURE REVIEW

In recent years we have witnessed the use of Internet for various health care related reasons from the perspective of end-users, especially patients. The users, who when being ill used to depend only on the doctor and his treatment, now want to actively influence and take control over their health and the healing process. The Web, with the different services it provides and novel mobile technologies, represents a suitable and reliable communication and collaboration channel. Primary health care demands of users in the context of (their) health are: to get as much information as one can from different aspects about a specific disease; to take more active role in curing the disease; to use the applications and electronic services with which one can simplify the process of healing, etc.

These e-services in collaboration with health care institutions, their services and information systems, combined with active role of all participants of health care system, are defined as e-health, which is a part of the global strategy of Health In recent years in the context of global e-health activities, many different applications and services have been developed which serve users in improving their health or getting the information they need.

The services can be roughly divided into three groups which enable 1) acquiring information, 2) social inclusion and networking, and 3) information and automation of different user scenarios with health care institutions. Even though Internet offers a great potential in developing services in the area of e-health, huge amounts of data and different fragmented services cause trouble for the users.

They have trouble identifying suitable and verified services from the aspect of reliability, safe use and data confidentiality. Due to fragmentation of information, users have to utilize several different applications and services at the same time, which takes more time, especially because of disconnection of some services, which can clearly be associated. Because of the dimension of the Internet, users are not even aware of the existence of some services. A potential solution for these troubles lies in the development of a larger collaboration system that will logically connect different services and applications and consequently enable access through one entering point.

III. SYSTEM COMPONENTS

A. Temperature Sensor (LM35):

The LM35 series are precision integrated circuit LM35 temperature sensors, whose output voltageis linearly proportional to the temperature in Celsius (Centigrade). The LM35 sensor 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 sensor does not require any external calibration or trimming to provide typical accuracies of ±¼°C at room temperature and ±¾°C over a full -55 to +150°C temperature range. TheLM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. As it draws only 60 µA from its supply, it has very low self-heating, less than 0.1°C in still air.

B. Blood Pressure Sensor:

Blood pressure sensor is a device that measures the pressure of the blood in the arteries as it is pumped around the body by the heart. When our heart beats, it contracts and pushes blood through the arteries to the rest of our body. This force creates pressure on the arteries. Blood pressure is recorded as two numbers—the systolic pressure (as the heart beats) over the diastolic pressure (as the heart relaxes between beats). Some special features of blood pressure sensor includes automatic measurement of systolic, diastolic and pulse, (ii) large LCD screen with LED backlight, and (ii) pad key.

C. Motion Sensor (ADXL345):

The ADXL345 is a small, thin, low power, 3-axis MEMS accelerometer with high resolution (13-bit) measurement at up to +-16 g. Digital output data is formatted as 16-bit twos complement and is accessible through either a SPI (3- or 4-wire) or I2C digital interface. The ADXL345 is well suited to measures the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion or shock. Its high resolution (4 mg/LSB) enables measurement of inclination changes less than 1.0 degrees. Several special sensing functions are provided. Activity and inactivity sensing detect the presence or lack of motion and if the acceleration on any axis exceeds a user-set level. Tap sensing detects single and double taps. Free-fall sensing detects if the device is falling.

IV. METHODOLOGY FOR PROPOSED SYSTEM

By exposing the human body to biosensors (Wearable sensors), we measure physiological parameters—blood pressure level, pulse rate, body temperature, body position, EMG Sensor. The sensors are directly connected to low power microcontrollers. These microcontrollers in turn connected to Wi-Fi module. Whenever there is change in human parameter the sensor will sense the parameter and accordingly gives the analog signal, Microcontroller which itself has inbuilt ADC will convert analog signal from sensor to equivalent digital value and it is calibrated to its unit scale and transmitted wirelessly to server using Wi-Fi module to remote cloud server. The cloud used for this purpose is thing speak. It has a wide array of options to display data in graphical view with bar graphs, line graphs etc.

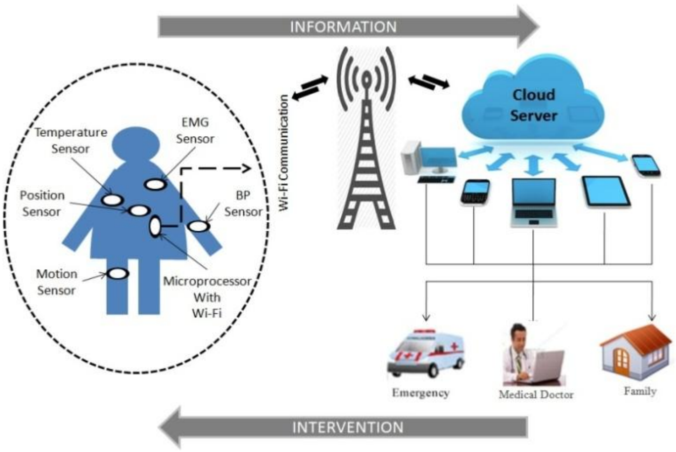
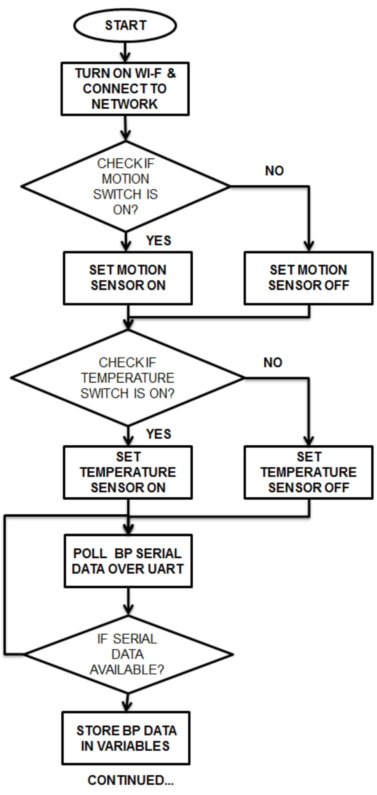


Figure.1. Proposed Wearable Health Monitoring System

The proposed system focuses on collection of patient's vital health parameters. The data is then stored in Cloud so that data can be accessed via Internet from anywhere anytime.The device has user selectivity sensors which can be switched on/off using dedicated switch implementing blocks technology. In this system we have selectivity for motion sensing and temperature sensing.

Figure.2. Implemented Wearable Health Monitoring Device

V. FLOWCHART



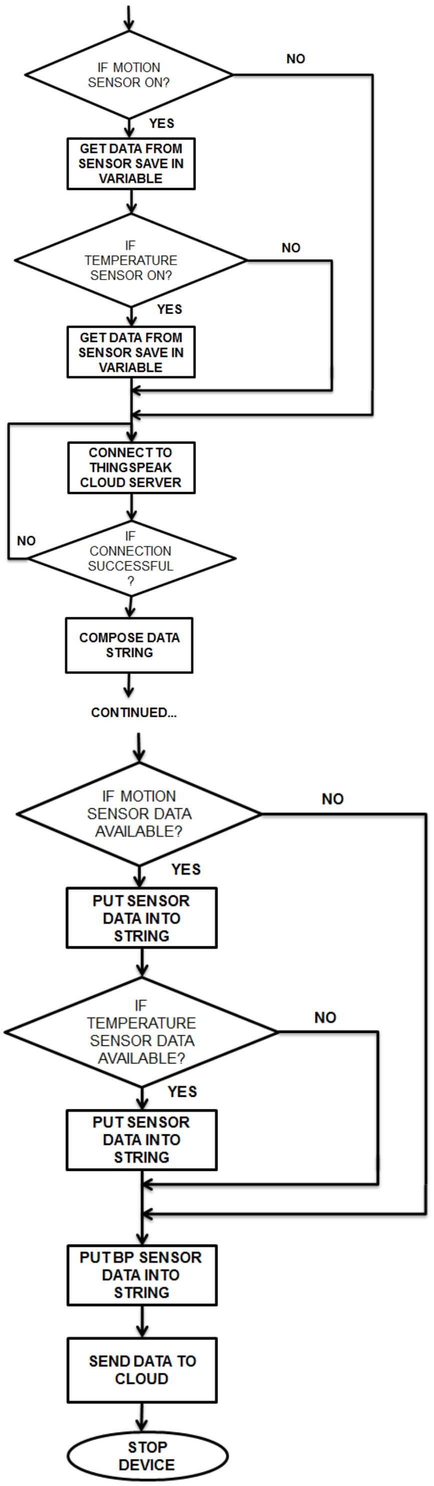


Figure.3. Flowchart of wearable health monitor device

VI. CONCLUSION

In this paper, we presented the implementation of blocks technology in the field of wearable health monitors. Wearable sensors, particularly those equipped with IoT intelligence, offer attractive options for enabling observation and recording of data in home and work environments, over much longer durations than are currently done at office and laboratory visits. This approach makes the device scalable to the use of patients/customers. This in turn makes the overall system efficient for radically improving healthcare while reducing costs. We highlighted several of the challenges in sensing, analytics, and visualization that need to be addressed before systems can beused for seamless integration into clinical practice.

VII. REFERENCES

[1]. YogitaBobade, Prof. R. M. Walli, “A Review of Wearable Health Monitoring Systems”, IJTEEE, ISSN (2278-8875), Volume 4, Issue 10, PP- 2-5, October 2015

[2]. Jubi Rana, Abhijeet Bajpayee, “HealthCare Monitoring and Alerting System Using Cloud Computing”, International Journal on Recent and Innovation Trends in Computing and Communication ISSN: 2321-8169 Volume: 3 Issue: 2, February 2015

[3]. Amna Abdullah, Asma Ismael, Aisha Rashid, Ali Abou-ElNour, Mohammed Tarique, “Real Time Wireless Health Monitoring Application Using Mobile Devices”, International Journal of Computer Networks & Communications (IJCNC) Vol.7, No.3, May 2015