IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

A Review: Health Monitoring System using IOT

[1]Dole Manisha, [2]Yerigeri V V
[1]M. Tech Student, [2]Assistant Professor
[1]BATU,

***Abstract*— Expansion in health monitoring systems which allow a constant remote patient monitoring and diagnostics by the doctors. The wireless nature of network and use of sensors gives new method to healthcare system. There is no physical operation is required, all the things are getting automatic by the use of wireless sensor nodes. By continuing at a remote place doctor can operate patient easily with the help of technology use in wireless network. In this paper, we present a concept for a better improvement in healthcare system for patient with the help of information technology by using wearable on body sensor and in body sensors for patient continuous monitoring. These sensors are take the reading of patient and send it to doctor can help the patient for enlightening health. In this paper, we discuss various techniques and innovations new movements in wireless sensor network for continuous health monitoring. The main aim of this proposed system is critical patient can be operated by doctor as well as care taker as soon as early. So, to save the life of critical patient health monitoring system plays an important role.**

Keywords—AAL, IOT, WSN, WBAN, PSoC.

I. INTRODUCTION

Wireless sensor network is a system which can continuously monitor the health of patient to prevent and early detection by of disease. The increased use of mobile technologies and smart devices within the area of health has caused great impact on the planet. Health experts is increasingly taking advantage of the advantages these technologies bring, thus generating a big improvement in health care in clinical settings. Likewise, countless ordinary users are being served from the benefits of the M-Health (Mobile Health) applications and E-Health (health care supported by ICT) to enhance, help and assist their health [1].

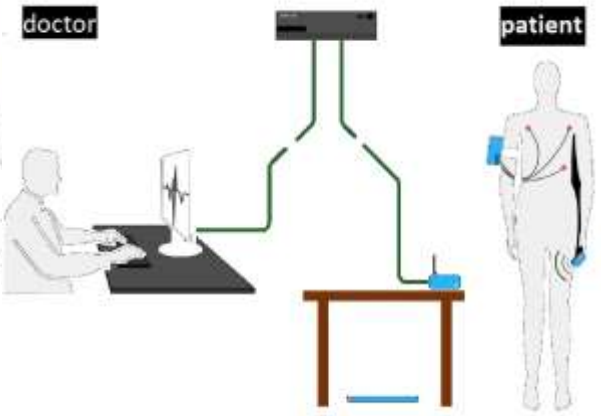


Figure 1 General Diagram of Patient Monitoring System

A wireless sensor Network for Composed of a large number of sensor nodes to interact with physical world [2]. Low power tiny cheap, small size sensors are capable of sensing wireless communication [3]. Human Health Monitoring is becoming necessary. Longer lifetimes create challenging demands for elderly people with degrading mental & physical abilities. Ambient Health Monitoring (AHM) can be used proactively as a mean of encouraging healthy life strategies in people [4]. The Ambient Assisted Living (AAL) projects focus on specific aspects of service like in Dia-trace project [5], which combines activity detection, Meal Photographs, blood sugar monitoring system. [6] Portable devices like pulse monitors, pulse rate meters, spirometers and vital sign monitors are essential instruments in medical care. Traditionally, the sensors for these instruments are attached to the patient by the wires; and the patient sequentially becomes bed-bound. In addition, whenever patient must be moved, all monitor has got to be disconnected then reconnected later. Nowadays, all of those Time-consuming jobs might be terminated and patients might be liberated from instrumentation and bed by wireless technology. Integrated wireless technology, these wireless devices. Continuous and pervasive medical monitoring is now available with the presence of wireless healthcare systems and telemedicine services [25]. Wireless Sensor Network (WSN) are becoming increasingly important for monitoring patients both in the clinical setting and at home. They provide more comfort for patients, with the absence of wires reducing costs and providing more flexibility. WSN are also fundamental in AAL since these smart systems, tailored to user's needs, collect information about users and their ambient to provide personalized feedback. Wireless Sensor Networks can integrate vital sign sensors and also environmental sensors [7] such as humidity sensor. Reason behind to develop that type of system is for making patient comfortable in day to day lifestyle. We are going to use esp8266 with Arduino. Here, ESP8266 is using for transmit data to server and mobile. It is a Wi-Fi module. It connects with hotspot for internet connection. Arduino UNO R3 is a microcontroller used here for processing signal and interface sensors. Till date Arduino is a very good and reliable microcontroller for IOT project, and it has easy interfacing with less complexity and durability. Sensor readings are automatically store on server as directed by program and doctors can get readings when they want.

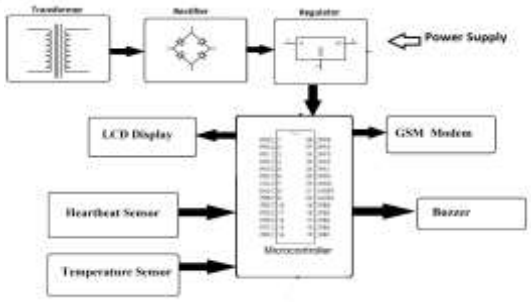
II. LITEATURE REVIEW

X smart grid applications, e.g. real-time system monitoring, load control, and building automation. Unfortunately, most ZigBee channels overlap with wireless local area network (WLAN) channels, leading to severe performance degradation thanks to interference [15]. Energy consumption is the core issue in wireless sensor networks (WSN). To generate a node energy model may be able to which can accurately reveal the energy consumption of sensor nodes is a neighborhood important a part of protocol development, system design, and performance evaluation in WSNs [16]. In this paper, by studying component energy consumption in several node states and within state transitions, the authors present the energy models of the node core components, including processors, RF modules and sensors. Furthermore, this paper reveals the energy correlations between node components, then establishes the node energy model based on the event-trigger mechanism. The attached sensors on patient's body forms a wireless body sensor network (WBSN) and that they are ready to sense the guts rate, vital sign then on. This system can detect the abnormal conditions, issue an alarm to the patient and send a SMS/E-mail to the physician [17]. The system is in a position to hold out a long-term monitoring on patient's condition and is provided with emergency rescue mechanism using SMS/E-mail. The application area we consider is that of remote cardiovascular monitoring, where continuous sensing and processing takes place in low-power, computationally constrained devices, thus the facility consumption and complexity of the processing algorithms should remain at a minimum level [18]. Experiments administered on ECG signals from publicly available databases, covering both standard 12-lead and ambulatory recordings, also as on a non-commercial database show that the performance is extremely on the brink of the state-of-the-art ECG delineates. The interference effect of the Wi-Fi signals on ZigBee channels has been investigated supported real experiments in several noisy wireless environments [19]. The collected medical data from bio-medical sensors should be transmitted to the closest gateway for further processing. Transmission of data contributes to a significant amount of power consumption by the transmitter and increase in the network traffic [20]. In this paper, we propose a coffee complex rule engine based health care data acquisition and smart transmission architecture, which uses IEEE 802.15.4 standards for transferring data to the gateway. In this paper, ECG data acquisition, and transmission architecture is taken into account. The metrics used for performance analysis are the amounts of power saving and reduction in network traffic. It is shown that the proposed rule engine gives a big reduction in energy consumption and network traffic generated. We aim to develop practical ZigBee deployment guideline under the interference of WLAN. We identify the "Safe Distance" and "Safe Offset Frequency" employing a comprehensive approach including theoretical analysis, software simulation, and empirical measurement. In addition, we propose a frequency agility-based interference avoidance algorithm [21]. The proposed algorithm can detect interference and adaptive switch nodes to "safe" channel to dynamically avoid WLAN interference with small latency and tiny energy consumption [22].

III. EXISTING SYSTEM

A. Health monitoring system using LCD:

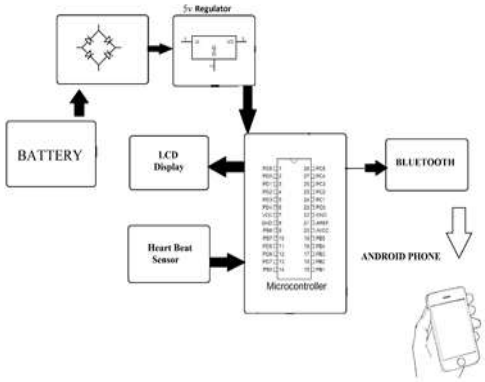
The proposed system architecture contains three main units namely monitor unit, sensor unit, and control unit. The sensor unit acquires the multi-parametric medical data like Electro Cardiogram (ECG), blood heat, glucose levels, heartbeat etc. from different sensors using various signals processing techniques. Better proactive analysis is often given as long as the info collected from the patient is assessed properly. The collected parameters are given to controller unit. It compares collected data values to original values. If any deviation occur, it produces control signaling to patient via actuator. For monitoring purpose LCD is used.



B. Health monitoring system using Bluetooth

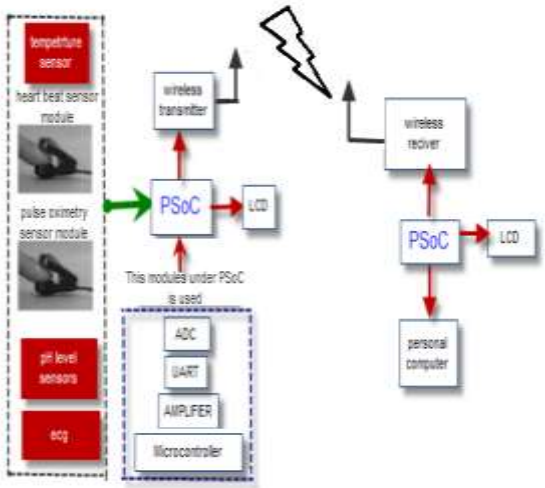
In this health monitoring system, microcontroller LPC2148 used for processing with sensors like LM35 for temperature sensing, and heart rate sensor for measuring pulse rate. The microcontroller we use d for this project is ARM seven LPC2148 has many essential alternatives like ADC, SPI, I2C, PWM, and RTC. Microcontroller uses C or C++ language which are outdated now. And these require another software like flash magic to upload code in microcontroller. Microcontroller collect value from sensor, process them and forward to Bluetooth

terminal. Bluetooth send message to user mobile or connected device and shows message on display [23].

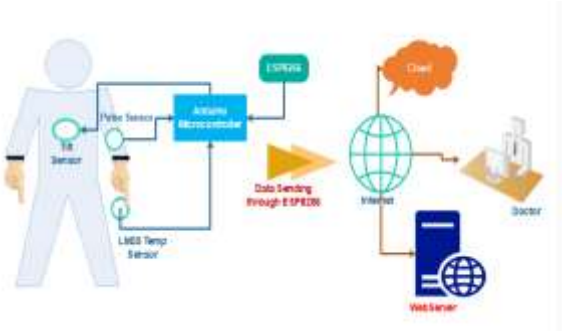


C. Health monitoring system using zigbee and ethernet

In this system, a portable real-time wireless health monitoring system is implemented using Programmable System on Chip (PSoC) and developed. The developed acquisition system is employed for remote monitoring of patients' temperature, pulse and oxygen saturation in blood i.e. pulse oximetry, pH level of blood, ECG. This system allows the physician ready to understand patient's scenario on the PC screen by wireless module. Here low cost, low power consumption and versatile topology ZigBee wireless module is employed to sense remote patient data. All sensor data are transferred within a group of ZigBee wireless module from here we are using Ethernet module (TCP/IP) to send the parameters values through static LAN. We can access the data from web page. The goal is to demonstrate the chances offered by system-on-chip programmable devices in specific processing systems, where the prices make the utilization of specific integrated circuits not affordable. The sensor unit consists of (1) temperature sensor; (2) two sorts of LEDs and photodiode packed in Velcro strip that's facing to a patient's fingertip for pulse oximetry and heartbeat; (3) three color LED with LDR for pH level;(4) ECG; (5) Microcontroller unit for interfacing with wireless module, processing all biomedical sensor data sending to base PC; PSoC circuits built by Cypress Micro systems which represents a new concept in embedded systems design that replaces multiple traditional MCU-based system components with one, low cost single-chip programmable device. PSoC designer tool will be used for implementing the application and building the software [24].



IV. PROPOSED SYSTEM



In this proposed system, the Arduino microcontroller with ESP8266 uses for sending data to cloud. The microcontroller is useful to access sensors values and forward. The pulse sensor uses to calculate the pulse rate of human being. Following table shows the age wise pulse rate.

By this pulse sensor the pulse rate can be calculated and if any value greater than threshold then it will show the warning message on doctor's portal.

Table 1 Normal Range BPM

Age	Normal heart rate (bpm)
Up to 1 month	70 to 190
From 1 to 11 months	80 to 160
From 1 to 2 years	80 to 130
From 3 to 4 years	80 to 120
From 5 to 6 years	75 to 115
From 7 to 9 years	70 to 110
Over 10 years	60 to 100
20 years	100 to 170
30 years	95 to 162
35 years	93 to 157
40 years	90 to 153
45 years	88 to 149
50 years	85 to 145
55 years	83 to 140
60 years	80 to 136
65 years	78 to 132
70 years	75 to 128

Normal blood heat varies by person, age, activity and time of day. The average normal blood heat is usually accepted as 98.6°F (37°C). Some studies have shown that the "normal" blood heat can have a good range, from 97°F (36.1°C) to 99°F (37.2°C). A temperature over 100.4°F (38°C) most frequently means you've got a fever caused by an infection or illness. Body temperature normally changes throughout the day. If body temperature increased then, also warning message displayed on portal. A tilt sensor is an instrument that's used for measuring the lean in multiple axes of a reference plane.

Tilt sensors measure the tilting position with regard to gravity and are utilized in numerous applications. They enable the easy detection of orientation or inclination of body. To detect movement or motion of any part of body.

The all sensor connected to Arduino microcontroller, the sensed data transfer to internet through ESP8266. The cloud "ThingSpeak" accept values and will generate graph as per values received meanwhile the data also transfer to web server also. Web Portal is use here to access data of patient through remote place.

ACKNOWLEDGMENT

I would like to thank Dr. Mr. Yerigeri V V, Assistant Professor for guidance and support. I will forever remain grateful for constant support and guidance extended by him, for the completion of paper.

FUTURE SCOPE

As it is shown by the current technology status, Wireless health monitoring system have the potential to revolutionize healthcare by providing low-cost solutions for ubiquitous, all-day, unobtrusive personal health monitoring and are expected to enable early detection and better treatment of varied medical conditions also as disease prevention and better understanding and self-management of chronic diseases. With variety of benefits over wired 2 of 12 alternatives, including: simple use, reduced risk of infection, reduced risk of failure, reduce patient discomfort, enhance mobility and low cost of healthcare delivery , wireless applications cause exciting possibilities for brand spanking new applications in medical market. In future we can replace it with more compact microcontroller for more compact and increase power. So, it can be wearable and less size is require.

CONCLUSION

This paper presents implementation, and design of real-time health monitoring system by using IOT i.e. using esp8266. So at last we conclude that by use of esp8266 with Arduino has been the cost effective and reliable implementation used for wireless recording and transmission system of sensor signals to doctor, and it is very useful to the remote patients. The use of an Arduino as the building block of the wireless recorder has the features of intelligence, compact, and reliable. By the aid of this integrated microcontroller, external components, and hence wiring are kept to a minimum. So, system is less complicated.

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