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WBAN Based Modern Medical Care Monitoring by IOT Approach

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Abstract

The Internet of Things, in short IoT, is used to design a body sensor network (BSN) in which sensors can be handled and monitored through the Wi-Fi access, wherever the location may be. Now, what is meant by IoT? A new technological network of physical devices, vehicles and many other items which eventually gained attention in cyber-physical systems is the Internet of Things. The computing system that is attached to electronics, software sensors, actuators and network connectivity makes the collection and exchange of data easier.

Keywords: -Respiratory, Temperature, Blood pressure, Heartbeat sensor

1. INTRODUCTION

This paper aims at the health monitoring check-up with a wireless network known as WBAN also called Body Sensor Network (BSN) that allows the doctor to have a look at the medical condition of the patient from anywhere of the world. Doctors can examine from anywhere in the world using smartphone or laptop. IoT seems helpful in many situations for healthcare professionals including medical emergencies. This existing technology enhances the accuracy and size of the medical data. This system uses four sensors namely

- Respiratory sensor for taking the respiration rate of the patient
- Temperature sensor for taking temperature of the patient
- Blood pressure sensor reads the BP level
- Heartbeat sensor to take the heartbeat

Now by creating a webpage using PHP HTML and with Wi-Fi module, all this collected information are given on the internet after readings being measured by PIC microcontroller with the help of C coding.

2. LITERATURE REVIEW

2.1 IoT BASED SMART SECURITY AND HOME AUTOMATION SYSTEM

AUTHOR: Ravi Kishore Kodali , Vishal Jain, Suvadeep Bose and Lakshmi BoppanaYEAR: 2017

Despite healthcare, IoT plays a vital role in the security of home. Although many systems are prevalent for the safety of home, the facilities available by this system are different. When a person passes or enters the home or the home alarm system works, the status is sent to the owner's mobile. The person will receive it on the phone whether or not the mobile is connected to the internet. An onboard Wi-Fi and microcontroller are used in the system.

2.2 INDUSTRIAL AUTOMATION USING IOT

AUTHOR: Bhosale Kiran Uttam1, GalandeAbhijeet Baspusaheb2 and Jadhav Pappu Shivaji3YEAR:2017

When it comes to industrial applications, safety is the no.1 priority as gas leakage and fire are most common. With the use

of IoT, it can be avoided to a certain extent with the alarm signals.

2.3 A STUDY ON AGRICULTURAL CROP MONITORING USING IOT

AUTHOR: Dr.D.K.Sreekanth and Kavya.A.M, YEAR: 2016

A traditional farming has got a lot to do from weather to agriculture. With the use of IoT and wireless sensor networks, farmers got all access to view the farm field using the wireless camera attached. Monitoring the weather, temperature, and detection of weed, level of water, crop growth from anywhere in the world improves the productivity of farmers.

3. PROJECT DESCRIPTION

3.1 EXISTING SYSTEM

Although IoT provides a lot of facilities, it got some drawbacks too. Due to the security reasons of the existing systems and limited range of connectivity compared to other systems, an algorithm is proposed to maintain security.

3.2 PROPOSED SYSTEM

After the algorithm being proposed the new system got advantageous facilities such as high data reliability, data loss is reduced, high network connectivity. This proposed system improves the security using BSN-care and patient's record is highly protected.

3.3 BLOCK DIAGRAM

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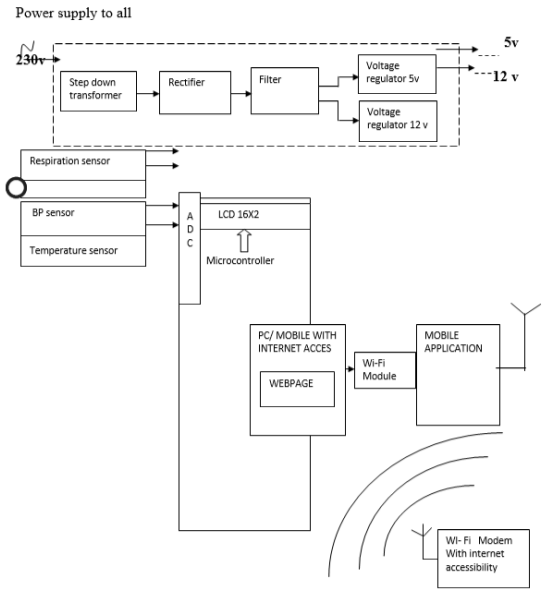


4. HARDWARE DESCRIPTION

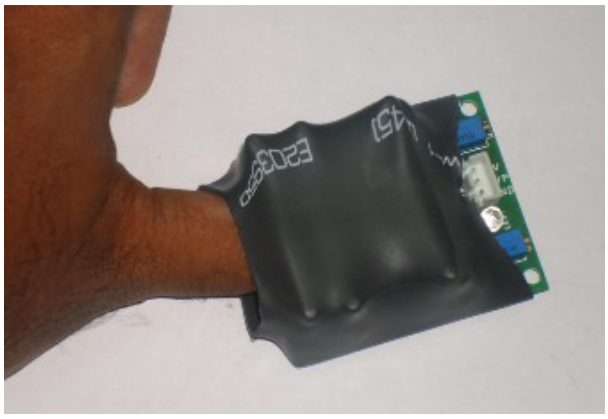
4.1 PIC MICROCONTROLLER

4.1.1 GENERAL DESCRIPTION

- High-Performance RISC CPU with 35 single word commands to learn
- Single-cycle directions apart from program branches
- High operating speed and Flash Program Memory and Data memory
- Pinout compatible with microcontroller
- Tangential features, Analog features, Special Microcontroller features, CMOS Technology

4.2 HEARTBEAT SENSOR

This version uses a reflective optical sensor for photoplethysmography. The principle of photoplethysmography is a non-invasive process of measuring the difference in blood volume in tissues using a light source and a detector. The reflected glow power varies with the pulsing of the blood with a heartbeat. A plan for this disparity against a point in time is referred to be a photoplethysmography.



4.4 TEMPERATURE SENSOR (Thermistor)

Thermistors major function is to display a large, expected and accurate change in electrical resistance when subjected to a matching change in body heat.

Thermistors are not "self-heated" for use in applications such as heat measurement, heat control or temperature compensation. Thermistors are obtainable in a range of types, resources and sizes depending on the reaction time and operating temperature.

Typical Thermistor

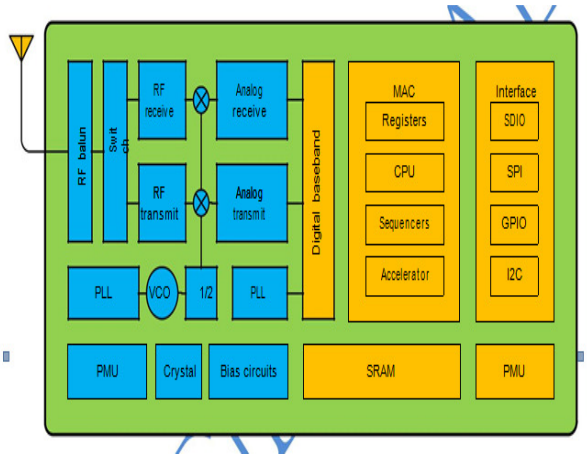
Negative Temperature Coefficient Thermistor

NTC Thermistor is the most commonly used type of temperature sensors. It reduces or decreases their resistive value as the functioning temperature around them increases. NTC Thermistors decrease in resistance with a boost in temperature and are available in a variety of base resistances and curves.

Using a Thermistor to Measure Temperature: Thermistor is a resistive and an active type of a sensor. It requires an excitation signal for its operation, and any changes in its resistance as an outcome of changes in temperature can be transformed into a voltage change.

4.5 ESPRESSIF SMART CONNECTIVITY PLATFORM ESP8266

ESCP provides an unmatched capacity to embed Wi-Fi capabilities within other systems, at the least cost with the maximum functionality.



ESP 8266 Block Diagram

Technology overview and Features

This is the best complete application processor booting up with self-contained Wi-Fi networking solutions with an external flash attached.

Integrated temperature sensor supports antenna diversity, wake up and transmit packets and standby power consumption

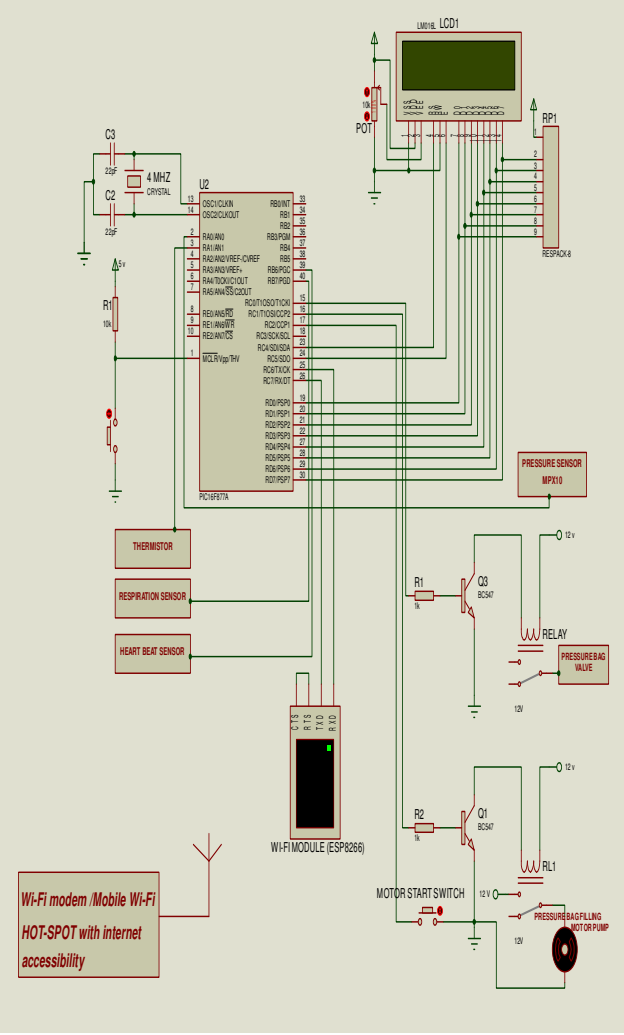
It has been planned for mobile, wearable electronics and Internet of things applications with the intention of achieving the least power utilization with

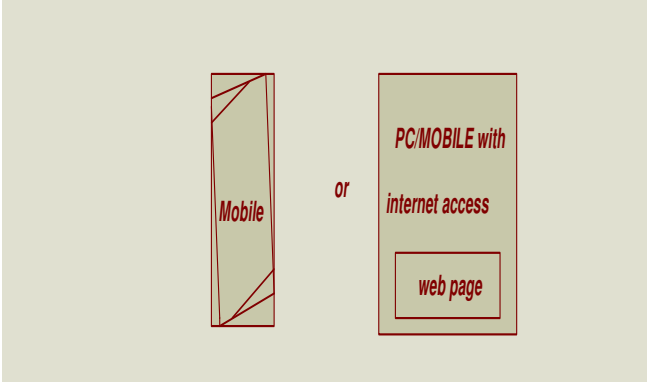
a mixture of quite a few proprietary procedures

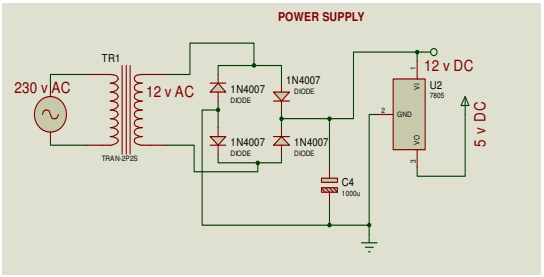
Other hardware devices like blood pressure measurement devices and display system as laptop or smart phone are used.

5. SOFTWARE DESCRIPTION

The simulated software architecture is given below.







RESULT AND DISCUSSION

The IoT is expanding the sensory capabilities for all products by providing visibility into the field and usage patterns, unleashing transformative opportunities for the entire ecosystem of caregivers, patients, payers, medical devices and pharmaceuticals companies. The lack of standards, a crowded product landscape and the relatively nascent stage of technology compel medical device companies to carefully craft their IoT strategies.

The complexity of medical device IoT is the result of the wide spectrum of medical devices that use different data communication protocols. We expect

interoperability between devices will improve as standardization takes hold. Communication consumes a great deal of power in devices, and with the explosion of the number of IoT-enabled devices, we expect considerable advancements in energy harvesting technologies.

Social concerns of unlawful invasion to privacy must also be addressed. Moreover, there is genuine concern around how a device can be used to track movements of people. By enabling the medical devices with network connectivity capabilities, hospitals/patient home networks significantly increase the risk for data exfiltration. The U.S. Federal Drug Administration (FDA) has provided guidance for managing cybersecurity in medical devices.6 We expect security-related offerings in the IoT to have a vigorous interest in the years to come.

CONCLUSION AND FUTURE WORK

The project on IoT based modern healthcare system is a vast field of research in which complete health condition of the patient like ECG, EEG can be checked. Here in our project we check the conditions of temperature, respiration, pulse rate and BP of the patient is checked and all these conditions of the patient can be examined by the doctor from anywhere in the world with the help of microcontroller and Wi-Fi connection. The project is having a greater usage in medical field. This paper presents a wearable sensor node that enables the implementation of an autonomous WBAN for IoT connected applications. The pro- posed wearable sensor nodes can be placed on different positions of the body to measure physical signals like the temperature distribution and heartbeat. In the future, the wearable sensor node can accommodate more signal detections to cover many areas of WBAN applications. A web-based smartphone or laptop is used to display the sensor nodes' data and send emergency notifications. The proposed wearable sensor node can be further improved in terms of usability and wearability. For example, the shape of the sensor node can be redesigned to make it more wearable, like a longer but thinner "wrist band". More sensors for the vital signals of the human body can be integrated with the sensor node, like ECG and EMG.

The future work of this project include that the doctor can give actions to the patient in terms of emergency with the help of microcontroller and motors and taking actions or respond to the

condition with the help of internet. This has a vast field of research.

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