

HUMAN HEALTH MONITORING USING REDTACTON TRANSCEIVER

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Abstract -In IoT, where a network of devices are connected, low power design at the sensor and the sensor network is an important factor. Health Care applications of IoT includes remote monitoring of sensors and integration of the medical device. An efficient mode of communication for near-field body sensor network is Human Body Communication(HBC). Measuring of health-related parameters with high data rate and low power consumption when the doctor is unapproachable is its primary objective. Monitoring information leads to diagnosis and treatment. For Wireless Body Area Network the most energy efficient candidate turns out to be Capacitive Coupling Human Body Communication (CC-HBC). The path loss Reduction of CCHBC results in the lower power consumption. The transmitter can be placed in the form of Band-Aid, Chord, band etc. The PIC microcontroller displays the Heart Beat signals and the signal from the temperature sensor as volts, and it is in 5V. A transceiver named RedTacton is used for Human Body Communication. The RedTacton transmitter generates a gentle electric field on the surface of the human body. The RedTacton receiver will be a transistor or photonic electric field sensor. The sensor will detect the electric field and will be processed by the receiver. This processed signal thus becomes the data to be uploaded to the web application which can be accessed by the doctor to guide the nurse station.

Key Words: IoT, HBC, Galvanic Coupling, Capacitive Coupling, WBAN, RedTacton

1.INTRODUCTION

The Internet of Things (IoT) is defined as a system of interrelated mechanical and digital machines, objects, computing devices, animals or people that are provided with unique identifiers and the ability to transfer data over a network devoid of requiring human-to-human or human-to-computer interaction. Wearable computing and digital health devices are examples of how people are connecting to the Internet of Things landscape. IoT helps in communicating information to people and systems. The area of sensor network has grown significantly supporting a range of applications including medical and healthcare systems. A Wireless Body Area Network (WBAN) is a special purpose sensor network designed to operate autonomously to connect various medical sensors and appliances, located inside and outside of a human body.

These sensor nodes have wireless transmission capability and sense biological information from the human body to

transmit over a small distance to a control device worn on the body or placed at an accessible location.

1.1 Overview

HBC technology offers a more secure way to communicate information between wearable electronic devices. In capacitive coupling, a differential pair of electrodes is used both for transmitting and receiving. At transmission end, the electric field is induced to the human body using applying a signal between the electrodes. At the RX side, the two electrodes are at different distances from the body, so it is possible to detect a differential signal between them as a function of the varying electric potential of the person. The human body acts as a conductor between the TX and RX that are capacitively coupled to it. RedTacton, where Red stands for an auspicious colour and Tacton, denotes "triggered by touching" is used for communicating the information. A transmission path is formed at a part of the human body make contact with a RedTacton transceiver. With any body surfaces, such as the hands, fingers, feet, face, legs and skin, the communication is possible. RedTacton is moving through shoes and clothing as well.

1.2 Objective

The main aim of the system is to monitor the health condition of the patient when the doctor is remote and to facilitate rapid and sheltered care to the patient. Monitoring information leads to diagnosis and treatment. A doctor may work in one or more clinic so he cannot be available 24*7 which in turn will lead the patients to wait for hours to see the doctor. The proposed system enables the doctor to be up to date with the health status of the patient under observation. This updating of information can be carried out using web application. The measured health information is fed into the web application using nurse as a transmission medium. The proposed model could bring the following benefits

- The medical information will be transmitted in a faster and more comfortable manner
- Data loss during transmission is less comparing to standard communication
- It provides more security than other broadcast systems
- Power consumption is greatly reduced
- It does not require the electrode to be in direct contact with the skin

2. EXISTING SYSTEM

In the existing system, Galvanic Coupling is used for transmission of information. Galvanic coupling for intrabody communication denotes the technology of signal transmission through the body for body and implanted sensor communication. Galvanic coupling follows the approach of coupling alternating current into the human body. The signal is applied differentially over two coupler electrodes and received differentially by two detector electrodes. The coupler establishes a modulated electrical field, which is sensed by the detector. Therefore, a signal transfer is established between the coupler and detector units by coupling signal currents galvanically into the human body.

Disadvantages:

- Short range transmission
- The electrodes are partially grounded
- It consumes higher power
- Does not facilitate remote access to the patient

3. PROPOSED SYSTEM

In the proposed system, the sensors are placed on the epidermis of the patient. The PIC microcontroller displays the Heart Beat signals and the signals from the temperature sensor. These signals are then forwarded to the RedTacton transceiver. The RS232 level converter converts the 5V signals to 12V signals. This processed signal thus becomes the data that can be viewed by the doctor which enable the doctor to guide the nurse station.

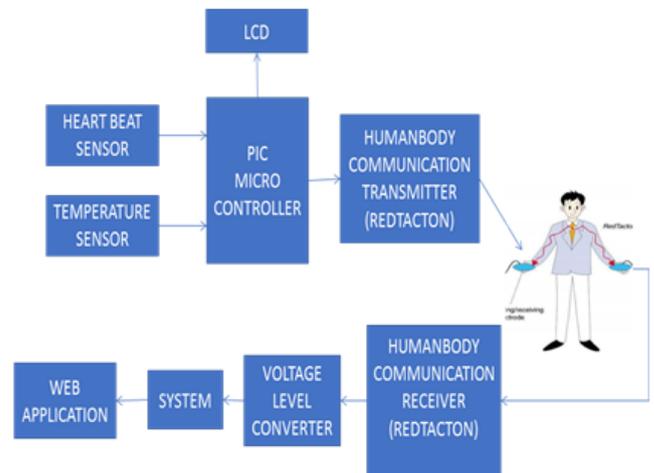
Methodology:

In capacitive coupling, a differential pair of electrodes is used both for transmitting and receiving. At the TX side, a signal is applied between the electrodes, and since the electrodes have a different capacitive coupling to the body, an electric field is induced to the human body and passes through the body. At the RX side, the two electrodes are at different distances from the body, so it is possible to detect a differential signal between them as a function of the varying electric potential of the person. In this approach, the human body acts as a conductor that forms a bridge between the TX and RX that are capacitively coupled to it. The environment is used as a reference to force or detect a variation of the electric potential of the human body.

Advantages:

- Safe and Secure transmission
- Less time consumption
- Accuracy is improved
- Reliable
- The data transmission rate is increased

SYSTEM MODEL



4. MODULES

DISPLAYING SIGNALS ON LCD

The signals from the temperature sensor and heart beat sensor will be digitalized and displayed on the 16*2 LCD. The temperature sensor used is LM35, and the signals from this sensor are of the analog form. It is then converted to digital form using analogue to digital converter. The heartbeat sensor used is LM358, and the signal from this sensor is directly in digitized form.

TRANSMISSION USING REDTACTON

The values from the Microcontroller will be passed to the RedTacton transmitter which is forwarded to the nurse with the help of transmitter probe. The transmitter probe contains signal electrodes which when comes in contact with the human body forms a transmission path. The transmission occurs at a rate of 10Mbps.

RECEPTION USING REDTACTON

The values from the transmitter probe will be transmitted to the receiver probe of RedTacton receiver and that information with the help of level converter will be fed to the personal computer. The usage of level converter is to convert the 5V signal from RedTacton receiver to 12V. Since the system accepts only 12V signals, this conversion takes place.

UPLOADING DATA

The data from the personal computer will be uploaded to the internet via a web application, and those can be viewed by the doctor. The doctor, in turn, can guide the nurse station with the preliminary steps to be taken. He can also prescribe the medicines if there is any need. The purpose of using web application is that it enables the doctor to access the information from a remote place.

5. CONCLUSION

In the era where monitoring of health has become a necessity, RedTacton transceiver will be of great use to common people. The livelihood of the common man can be improved significantly through interaction with sensors. The proposed system has potential to extend a wide range of benefits to patients, medical personnel, and society through continuous monitoring. It also helps to give immediate aid to the patients when the doctor is remote through the nurse station. This system includes a wearable device which can be worn by the patient enabling the updation of patient parameters in real time in both the PC and LCD display. The doctor can monitor the progress of patients' health by accessing the web application. Through its simple implementation, it makes everyday life easy and it paves a way to IoT in future.

6. FUTURE ENHANCEMENT

The applications of this system can be widened by including more modules and sensors like blood pressure sensor, ECG sensor, airflow sensor etc. In a few years when the nanotechnology will be more common and easily available, sensors which are much smaller and lighter can be used to build an even compact wearable device. In case of abnormal conditions, an alert can be given to both doctor and the nurse in the form of messages, calls or by generating alarms. RedTacton is a technology that uses the surface of the human body as a high speed and safe network transmission path. This technology stands out with exactness when the transfer of data is fast, feasible and more significantly reliable. So, in a few years, everything is going to fall under RedTaction technology.

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