

REDTACTON IN MEDICAL FIELD

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Abstract –

Now a day's electronic devices become smaller and lower in power requirements, and that they are less costly. We have begun to adorn our bodies with personal information and communication appliances. The objective of this study was to increase the safety of data communication through various biometric techniques and similar data security during the analysis of transmission characteristics and the distribution of the electric field throughout the human body in the body communication technology human (HBC). This paper proclaims model of a human area networking technologies that enables communication by means of "Touching". Redtacton technology was implemented to beat the weak radio signals, data speeds and security – risks on unwanted signal interceptions. Here, physical body is that the transmitting medium supporting IEEE 802.3 half-duplex communication at 10 Mbits/s. RedTacton uses the minute field generated by physical body as a medium to transmit the info .

Key Words: Human body communication, biometric, touching, IEEE 802.3, half-duplex communication.

1. INTRODUCTION

Red Tacton technology is an electronic future where information are often accessible whenever and wherever needed at our finger tips. Some of the communication system that's required to supply this immediate access to information are going to be Incorporated into our attire. Some data are securely transferred that should not be readable or writable to public as in the case of defence, bank data, etc.

But still there's a huge risk of knowledge being hacked by the anti-social elements. For the distance communications, also called Far-field communication, it requires radio frequency (RF) waves to transmit data over long distance where Personal Area Network is not possible to setup and hence Human Area Network

(HAN). But for the communication type which can be reached within our hands, also called as Near-field communication, Human Area Network can be introduced as a medium for transmission of data from start point to end point. During the last decade, health awareness and health control have increased among all groups of human beings and the absolute need to observe biomedical information daily, health care management and sensor analysis has increased. There is a demand to update the intelligence, efficiency, performance and security of personal and sensitive information of biomedical data sensors and to connect them with the Internet of Things (IoT) system for the stable functioning of the network around the body crucial. It is also necessary to customize the management of biomedical information through the protection and security of privacy. This in turn creates the need for communication at close range which originates in the human body, instead of long-range radio communications or other means. The human body communication technology (HBC), which uses the human body as a means of signal transmission, is one of the promising body network technologies (BAN) used for communication throughout the human body . This study focuses on HBC technology and studies the transmission characteristics and distribution of the electric field around the human body.

Furthermore, the transmission of heartbeat data using HBC technology is also studied. It is completely different from wireless and infrared technologies, because it uses the small field emitted on the surface of the physical body .

WHAT IS RED TACTON TECHNOLOGY

RED- auspicious colour for Japanese TACTON-action triggered by touching it had been developed by Nippon telegraph and telephone corporation

1.1 Features of RedTacton

Features of RedTacton Generally, there are three features supported RedTacton they're as follows,

- **Touch** - Touching, gripping and other human movements are often the triggers for unlocking or locking, starting or stopping equipment, or communication.
- **Broadband and Interactive** - Duplex, interactive communication is feasible at a maximum speed of 10Mbit/s. Since the transmission path is on the surface of the body, speed of data transmission doesn't deteriorate in congested areas.
- **Any media** - additionally to the physical body, various conductors and dielectrics are often used as transmission media. Conductors and dielectrics can also be utilized in combination.

2. LITERATURE SURVEY

Zimmerman et al. (1995) discovered body coupled communications accidentally while doing human interface research on position sensors at MIT. Simultaneously at the Sony Labs a similar technology was developed that resulted in the wearable key prototype. These discoveries led to initial media frenzy. But soon afterwards interest was lost in body coupled communications because of what was then thought were fundamental limitations of the technology (Zimmerman thesis mistakenly stated that the technology had fundamental limit of 852 Kb/s).

NTT(Nippon Telegraph and Telephone) developed RedTacton with an electro optical implementation, a speed of 10 Mb/s was reached. One of their applications was sending video through the physical body .

Later in 2004, the Skinplex technology became available which was very simple implementation with very low speeds and really low energy consumption. This implementation was not advanced enough for body sensor networks and was mainly used to identify the user.

M.Shingawa et al. (2004) describes a near-field-sensing transceiver for intra-body communication, during which the physical body is that the transmission medium. The essential component of the transceiver is an electric-field sensor implemented with an electro-optic crystal and laser light. This sensor is suitable for detection of small and unstable electric fields produced

by the physical body because it's extremely high input impedance. This transceiver enables IEEE 802.3 half-duplex communication of 10 Mb/s through an individual's body in an operating range of about 150 cm between the hands. Also the packet error rate of 0.04% is obtained at packet size of 1070 octet.

3. SYSTEM ARCHITECTURE

On the idea of above literature survey the proposed diagram for biotelemetry using human area networking is shown in figure 1. The setup has two sections namely, Transmitter and Receiver. The proposed system uses the human body as a transmission medium for data communication. Here, the biomedical data of a patient will be transmitted from the transmitter to the receiver section through human body.

For biotelemetry, few sensors are attached to the physical body along side RedTacton transmitter and therefore the data at the receiver section are often collected using the RedTacton receiver.

Here, the sensor module which is present in the transmitter section consists of Heart rate sensor, Respiratory sensor, Glucose sensor, Blood pressure sensor along with a PIC microcontroller. It is attached to the RedTacton transmitter.

The receiver section has RedTacton receiver and a monitor to display the info for biotelemetry function. A common ground must be connected between the transmitter and receiver.

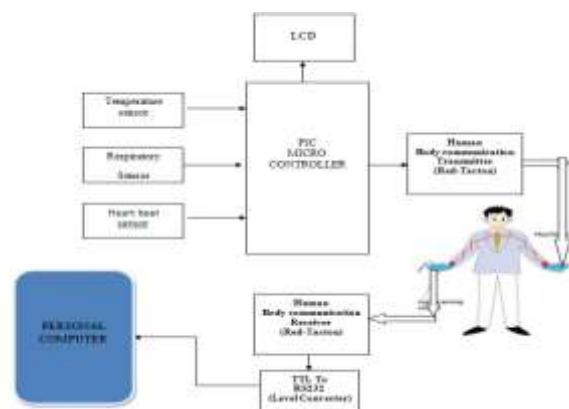


Fig 1: Block diagram

4. WORKING PRINCIPLE

The implementation of the Red Tacton surface electro-optical sensor provides a maximum duplex

communication speed of 10 mbps on the International Journal of Pure and applied math Special Issue 1672 surface of the physical body . The RedTacton transmitter induces a weak field on the surface of the physical body . The RedTacton receiver detects changes within the weak field on the body surface caused by the transmitter. The RedTacton depends on the proposition of the optical properties of an electro-optical crystal that varies consistent with changes within the weak field .The RedTacton detects changes in the optical properties of the electro-optical crystal employing a laser and converts the result into an electrical signal using a detector circuit. $E_a - E_b - E_c = E_s + U_{se}$ Use of the photonic field sensor, where E_a is that the field induced by the transmitter, E_b is that the field that returns to the transmitter plane, E_c is that the field within the receiver, and it's field detected within the receiver. Heartbeat data is obtained through a light detection method that a light sensor radiates light into the body and measures the change in intensity of the reflected light caused by a change in the concentration of oxygen in the blood in the capillaries.

In the heartbeat sensor used in this study, a green LED and a photodiode were generally used for a light source and a detector, respectively.

The heartbeat data when the transmitter is mounted on the patient's chest and transmits the data through the body to the recipient in the palm of the hand. The distance between the transmitter and the receiver is about 250 mm. The output waveform of the heartbeat sensor in the transmitter; the waveform after noisy data received through the body is subject to signal processing by a low-pass filter that rejects components of higher frequency than that of heartbeats. Noisy components are superimposed on the output waveform of the heartbeat sensor, because the heartbeat sensor used in this study is more suitable for fingertips or ear lobes with many capillaries. Although the sensor output is very noisy when the sensor is applied to the wrist with some capillaries, it is possible to determine the heart rate as a function of the waveform after processing the low pass filter signal.

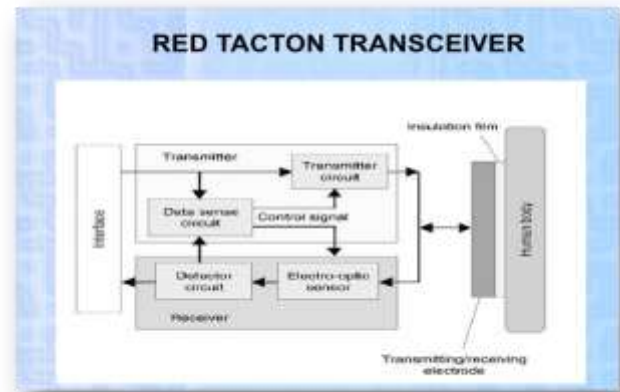


Fig 2: RedTacton Transceiver

Advantages

- Data transfer is faster and easier.
- Data transmission speed is 10Mbps for shortest distance.
- Data loss during the transfer is low.
- Power consumption is lesser.
- Security is more.

Disadvantage:

- Though it is been used only within a few centimetres, the data can be transmitted via multiple person by touching each other.
- Cost is more; it can be reduced in future.

5. CONCLUSION

This influence of the study is based on HBC technology, one of the promising body network technologies, the characteristics of transmission and the distribution of the electric field around the human body have been studied. In subsequent investigations, the technology seems to be very reliable and the only security problem has been solved by introducing security measures. RedTacton security can be improved with other permissions such as biometric checks, such as fingerprints, diaphragm, biometric voice, etc. We can also improve security levels by introducing multiple levels of security in terms of transmitting sensitive information. RedTacton technology has its use in almost all fields of science where information transmission is required. RedTacton will eliminate the need for the user to have multiple access or authentication to access the requested information.

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