SPARSH: DATA TRANSMISSION THROUGH BAN

Swati Anil Rathod[1], Prof. Dinesh D. Patil[2]

[1] *M.E. Student, Dept. of Computer Science and Engineering, SSGBCOET, Bhusawal, Maharashtra, India*
[2] *HOD, Computer Science and Engineering, SSGBCOET, Bhusawal, Maharashtra, India*

ABSTRACT

All the user-friendly services require technologies that enable communication between people and objects in close proximity. A model of human area networking technology that starts the communication just by touching, such a technology called as Red Tacton. Human area networking technology is mainly used for communicating between mobile terminals and between terminals that are embedded in the environment became very important. The person body will be used solve further technology problems. The person's body acts as a medium. A transmission path is formed automatically when a person comes into contact with the two touch pads which are connected through USB TTL to the PC's(Device). Hence, files such as PDF file, Word file, JPEG file, etc will be transmitted from one device to other device.

Keywords: ***Red Tacton, Human Area Network Technology, Body Area Network Technology***

1. INTRODUCTION OF BAN

A body area network (BAN), also involves as a wireless body area network (WBAN) or a body sensor network (BSN), is a wireless network of changing computing devices. BAN devices may be embedded inside the body, embeds, may be surface-mounted on the body in a rigid position Whilst, there is a trend towards the shrinking of devices, in particular, networks consisting of several reduces body sensor units (BSUs) together with a single body central unit (BCU).larger decimeter sized (tab and pad) sized smart devices, accompanied devices, still play an important part in terms of acting as a data hub, data gateway and providing a user interface to view and manage BAN applications. From the last six years, the term "BAN" came to refer systems where communication is entirely within, on, and in the immediate proximity of a human body. A WBAN system can use WPAN wireless technologies as gateways to reach longer ranges. Through gateway devices, it is possible to connect the wearable devices on the human body to the internet. This way, medical professionals can access patient data online using the internet independent of the patient location [2].

Initial applications of BANs are expected to appear primarily in the healthcare domain, especially for continuous monitoring and logging vital parameters of patients suffering from chronic diseases such as diabetes, asthma and heart attacks. A BAN network in place on a patient can alert the hospital, even before they have a heart attack, through measuring changes in their critical signs. A BAN network on a diabetic patient could auto inject insulin through a pump, as soon as their insulin level drop away. Other applications of this technology include sports, military, or security. Extending the technology to new areas could also support communication by unnecessary exchanges of information between individuals, or between individual and machines.

A typical BAN or BSN requires essential sign monitoring sensors, motion sensing element (through accelerometers) to help identify the location of the monitored individual and some form of communication, to transmit vital sign and motion readings to medical practitioners or care givers. A typical body area network kit will consist of sensors, a Processor, a transceiver and a battery[3]. Physiological sensors, such as ECG and SpO2 sensors,

have been developed. Other sensors such as a blood pressure sensor, EEG sensor and a PDA for BSN interface are under development.

2. LITERATURE SURVEY

Human Area Network (HAN) technology is still a emerging technology. It has a very short history. HAN technology emerged by combining sensor network technology and biomedical engineering. Professor Guang-Zhong Yang was the first person to formally define the phrase "Body Sensor Network" (BSN) with publication of his book Body Sensor Networks in 2006. Some of the more common use cases for HAN technology are:

- Body Sensor Networks (BSN)
- Sports and Fitness Monitoring
- Wireless Audio
- Mobile Device Integration
- Personal Video Devices

Various use cases of HAN require different bandwidth, latency, power usage, and signal distance. IEEE 802.15 is the working group for Wireless Personal Area Networks (WPAN) [IEEE 802.15]. The WPAN working group identified the need for a standard for use with devices inside and around closely to the human body. IEEE 802.15 established Task Group #6 to develop the standards for HAN. The HAN task group has drafted a (private) standard that encompasses a large range of possible devices. The task group has given developers the decision of how to balance data rate and power.

P. Lakshmi Narayana, B. MeenaBharghava and P. Lakshman Kumar [3], The concept of intra body communication, which uses the minute electric field passed on by the human body to transmit information, was first proposed by IBM and Nippon Telegraph and Telephone Corporation (NTT, in Tokyo) has developed an innovative Human Area Networking (HAN) technology called RedTacton (Red = warm color, Touch + action = Tacton) that safely turns the surface of the human body into a data transmission path at speeds up to 10 Mbps between any two points on the body, giving peer-2-peer a whole new meaning. Communication is possible using anybody surfaces, such as the hands, fingers, arms, feet, face, legs or torso. Red Tacton works through shoes and clothing as well. When the physical contact gets separated, the communication is ended.

Hao Wang, Xian Tang, Chiusing Choy and Gerald Sobelman [1], Body Area Network (BANs) have become an extremely active research topic in modern advanced communication techniques. This is due to the growing number of wearable devices attached to the human body, especially for applications in medical treatment and biomedical sensors. Intra-Body Communication (IBC) uses the human body as a signal transmission channel. It can be used for transferring biomedical signals, such as Electrocardiography (ECG), blood pressure, neural recording, etc., and it can also support real time data exchange among various wearable devices. IBC has the advantages of low air radiation, low power, small size and privacy as compared to other conventional near-field wireless technologies.

3. WORKING OF THE SYSTEM

The block diagram of the system is shown in the figure 3.1. As shown in the figure, the proposed system consists of 3 main parts:

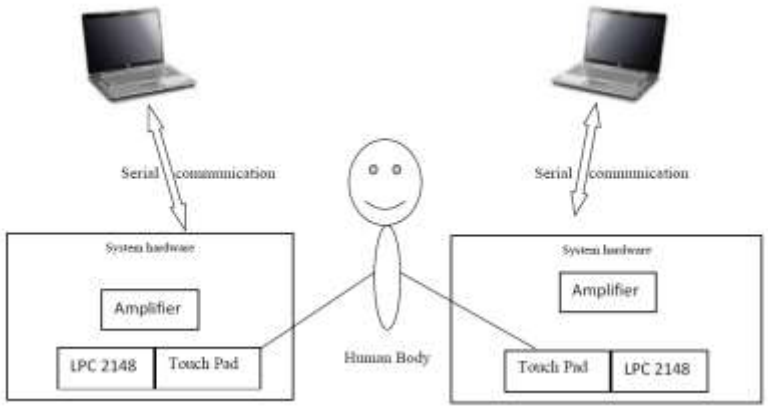

Figure 3.1: Block Diagram of Proposed System.

i. Personal Computer (PC)

A system is used to transmit data between two handheld devices. Here, there is computer as a handheld device. A Graphical user interface has been created on the computer is used to send and receive the data. For creating GUI, Microsoft VB.Net platform is used.

ii. ARM 7

This unit is the heart of the complete system. It is actually responsible for all the process being executed. It monitors and controls all the peripheral devices or components connected in the system. The controller here used is of LPC21XX family, i.e LPC 2148. This unit requires +3.3VDC for its proper operation. For its functioning, code is written in Embedded C and burned or programmed into the code memory using a programmer. All the connection will be done on ARM 7 processer.

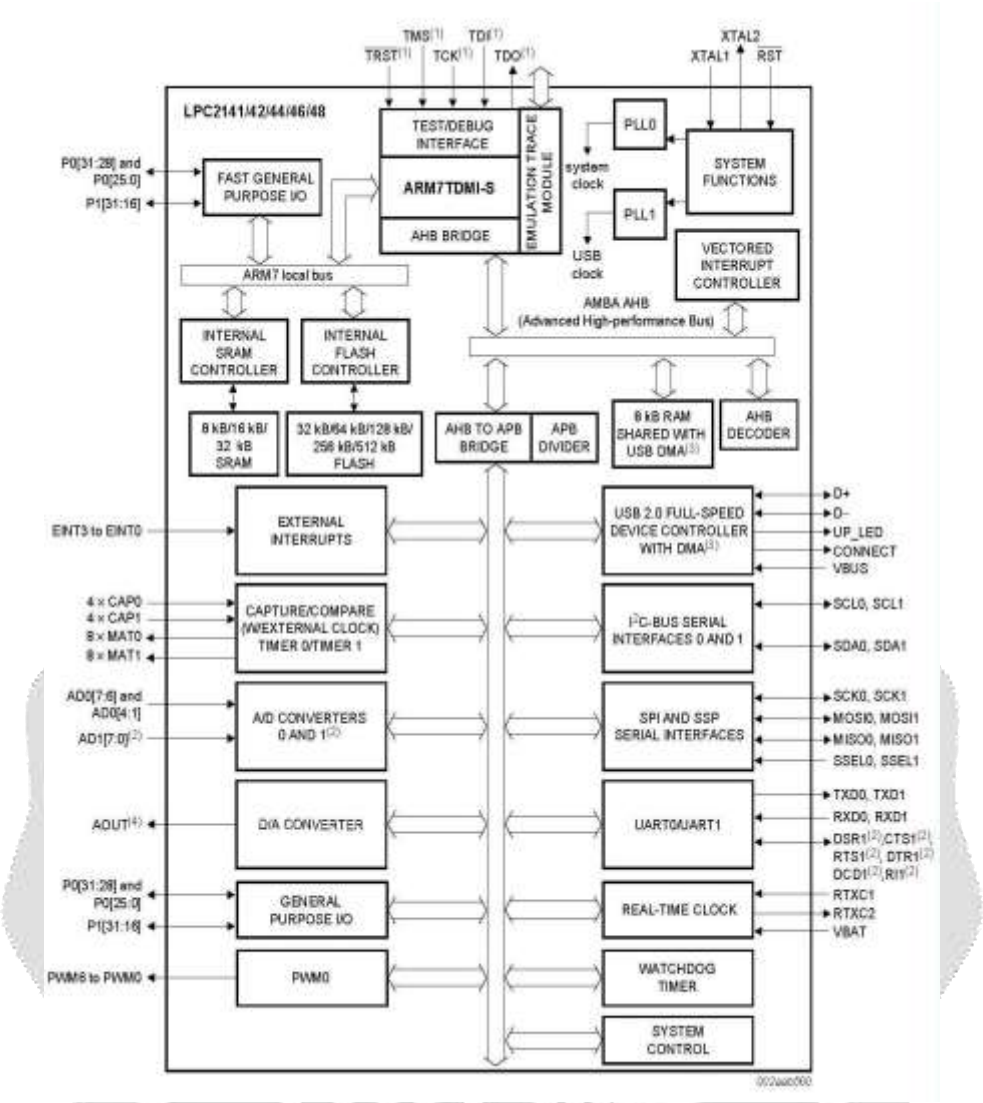

Figure 3.2 ARM 7 Processor

iii. Power Supply

This unit supplies the various voltage requirements of each unit. It consists of transformer, rectifier, filter and regulator. The rectifier used here is Bridge Rectifier. It converts 230VAC into desired 5V/12V DC.

Figure 3.3 Power supply

iv. Touch Pad

This unit is used to provide the connection between the system designed and the body. When the person touches the touch pad on both the side it transfers the data from one end to the other end and that transferred data displayed on the computer screen. Copper touch pad is mainly used for fast data transfer.

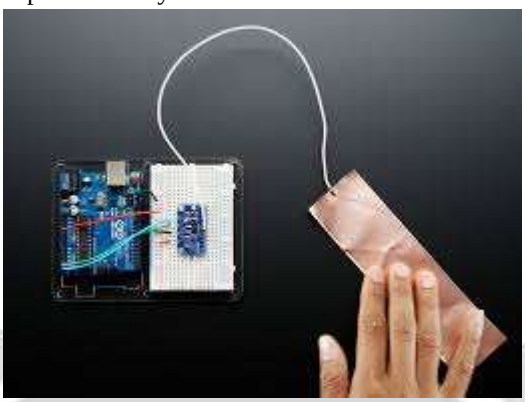

Figure 3.4 Touch Pad

v. Amplifier

This is the device which is used to amplify the received signal to increase the strength of the signal. Here, LM358 will be used as an amplifier. This unit requires +5VDC for its proper operation.

vi. LCD

LCD is simply used to acknowledge the beginning of transmission process once it started.

Figure 3.5 LCD Display

vii. USB

It is used to connect the one of the port of computer to the designed hardware to transmit/ receive data between computer and designed hardware.

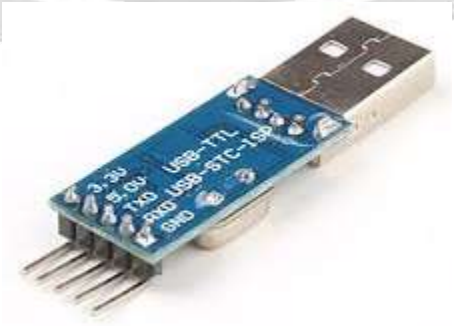

Figure 3.6 USB TTL

viii. Body

Finally its human body which is used as an innovative media to transfer data between devices which also acts as a signal channel.

5. HUMAN SAFETY

1. The transmitting and receiving electrodes of the RedTacton transceiver are completely covered with insulating film, so the body of the person acting as the transmission medium is completely insulated. This makes it impossible for current to flow into a person's body from the transceiver and does not harms the persons body.
2. When communication occurs, displacement current is generated by the electrons in the body because the body is refract to minute electrical fields. However, such displacement currents are very common everyday occurrences to which are all exposed.
3. RedTacton conforms to the "Radio frequency-exposure Protection standard (RCR STD-38)" issued by the Association of Radio Industries and Businesses (ARIB)[5].

6. ADVANTAGES

There are many advantages as listed below:

1. RedTacton does not require the electrode be in direct contact with the skin.
2. High-speed communication is possible between two arbitrary points on the body.
3. Body-based networking is more secure than broadcast systems, such as Bluetooth which have high range of about 10m.
4. Network congestion due to fall in transmission speed in multiuser environments is avoided.
5. High performance than Infrared technology
6. Outstanding than Wi-Fi.

7. DISADVANTAGES

1. It has no powerful applications that aren't already available.
2. It is very costly.

8. APPLICATIONS

There are number of applications of the developed system, some are given below:

1. Military Applications

- The critical success factors of this technology are that it must work or it will be inhabited for gun security. The last thing that the military wants is for soldiers not to be able to fire their weapons at the enemy because of a technical fault. The technology must provide the security that it is designed to provide. For example, the enemy or black marketers can't replicate the transceiver or defense program the transceivers for their use.
- Another critical success factor is that the technology is accepted by the soldiers whose life is on the line. They have to see the benefit of the security and they have to have faith in it and trust that it will work in all situations. For the technology to be adopted by the US population for gun control there will need to be a law passed that requires the technology.
- However it is possible that even without a law, a painstaking gun owner would elect to have the RedTacton technology installed on their gun to prevent a child or stranger from using the gun. The price of the RedTacton technology would need to be competitive for this to be possible.

2. Medical Applications

- One critical success factor of this technology in a medical application is it must work or it could create a life or death situation. If a death occurs that was caused by the technology not working properly, the negative publicity and paternity suit will force the technology to be deserted for a medical application.

- Another critical success parameter is that the cost must not exceed the goodness provided by the technology. Also, another factor is that the patients accept the technology.

3. Consumer Applications

- One important critical success factor in the Consumer applications arena is that RedTacton must obtain general approval in order for it to be useful and profitable. For this to happen, the technology will need to be competitively priced with competitive technologies. The product will grow in popularity quickly if more devices combine RedTacton technology.
- Additionally, consumers will need to be educated on the benefits and security features of RedTacton and how most importantly how it differs from current substitute that are being used such as Wi-Fi and Bluetooth.

9. CONCLUSION

Nippon Telegraph and Telephone in Tokyo, Japan is pursuing research and development of an original Human Area Network technology called RedTacton that safely turns the surface of the human body into a data transmission path at speeds up to 10mbps between any two points on the human body..

The Human Area Networking between body-centered electronic devices and PCs or other network devices embedded in the environment via a new generation of user interface based on totally natural human actions such as touching, holding, sitting, walking or stepping on a particular spot. It can be used for intuitive operations of computer based systems in daily life, temporary one-to-one services, device personalization, security and a host of other applications based on new behavior patterns.[5]

This technology definitely stands out with perfection, when transfer of data is fast, feasible and more importantly reliable. So, in few years from now everything is going to fall under this super technology. And, finally this conclude,

"FUTURE BELONGS TO RED TACTON"

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