

INTRA BODY COMMUNICATION

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ABSTRACT

The main objective of Intrabody communication is the characterization of the human body as a transmission medium for electrical signals. It is a short range Wireless communication technique specified by IEEE 802.15.6. This technique relies on the conductive property of human tissue to transmit the electrical signals among human body. For this purpose, a Red Tacton Chip can be used. Red tacton is a technology that uses human body as a medium for transfer of data. It uses body electrical field to transmit digital signals. This method of a data transfer is harmless. It is user friendly and fast.

Keywords: - Red Tacton, Arm7, Han.

I. INTRODUCTION

Communication has become main stay for today's digitally connected world and is being used in wide variety of applications like Person to person communication, Person to application communication, Machine to machine communication. Each communication requirement has specific needs of speed & data transfer capacity. Today we have various types of Communication Networks available at our disposal each with its own advantages & disadvantages. There are various short range communication channels apart from Human area network. The throughput of these channels is reduced as number of devices increases in an area like crowded space. This happens due to packet collision. On other hand infrared communication has lost its popularity due to its highly directional nature and need to be in visible range for communication. These limitations can be easily overcome through Human Area Network since persons own body is used for communication. It forms an exclusive channel for communication. This exclusivity also helps in large throughput for the communication channel.

IBC is replacement for Red tacton [1] [7] with overcoming all its drawbacks as it considers human body as a resistance and data is passed through the smallest resistive path through the body. It enables the practical Human Area Network 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 [2]. This chip can be embedded into various devices in future and thus data can be transferred from one device to other or to computer just by human body.

II. PROPOSED SYSTEM

The block diagram of the proposed system is shown in the figure below.

2.1 System Overview:

The proposed system will use an Arm7 controller and a USB TTL for serial communication with the PC. Now the data is passed from the transmitter to the human body. The human body acts as a transmission line and

passes the same data to the receiver. The copper pad is used for conduction of electrical signals from the body to the circuitry at both the ends i.e. transmitter as well as receiver. The amplifier is used to amplify the attenuated signals that are obtained from the human Body.

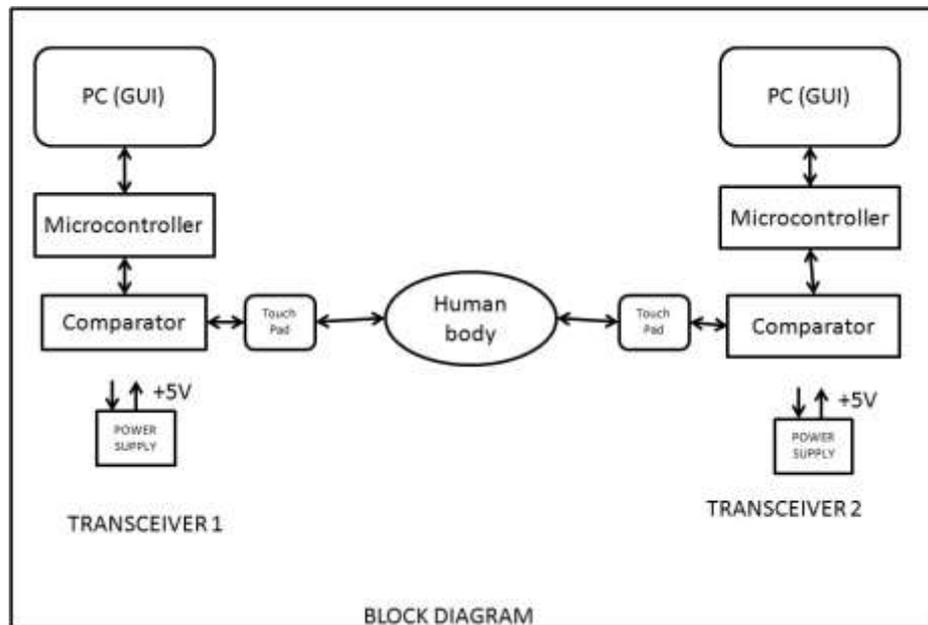


Fig1: Block Diagram

These signals are given to the controller and the controller helps to display the signals on the PC. Here both way communications is possible. Microcontroller monitors the complete system. Power supply unit will supply the various voltage requirements of each unit. This will be consists of transformer, rectifier, filter and regulator. The rectifier used here will be Bridge Rectifier. It will convert 230VAC into desired 5V/12V DC.

2.2 Techniques Used

A variety of IBC techniques have been proposed, which can be grouped into three main approaches: galvanic coupling, capacitive coupling and waveguide methods [3]. The first two rely on the coupling of low frequency, low-level currents and voltages into the human body, respectively, whereas in the last technique, an electromagnetic wave propagates through the body, which is commonly associated with the use of higher frequencies, thus involving a non negligible radiation component into the air. The most common of all are galvanic and capacitive coupling techniques, which are more suitable when lower frequency ranges are considered.

2.3 Features

The Following are the prominent features of the above discussed system.

1. It is found that body channel has lower attenuation than the air channel which implies the lower transmission power required for IBC.
2. Advantages of IBC over usual wireless RF standards such as Bluetooth and Zigbee are[4]:
 - (i) IBC is based on near-field coupling; in such a way that majority of the signal is confined through the surface of the body without much energy being radiated into the air compared to Bluetooth and Zigbee.
 - (ii) IBC technique has less electromagnetic interference and less susceptible to external interference.
 - (iii) Transferring data through Bluetooth involves:

- Search for device
- Connecting the two devices
- Selecting the data
- Transfer of data

This can be time consuming. Specially connecting the phone with Laptops or computers through bluetooth takes more time. Again IBC can avoid these problems.

2.4 Technology & Programming Languages

As microcontrollers are the core of these days digital circuit design in industry, this system uses ARM7 processor for the centralized operation and digital processing. The technology used here is embedded technology which is the future of today's modern electronics.

The followings are the various Programming Languages & Technologies that are going to be used in the proposed system,

For Embedded System,

- Embedded Technology,
- Embedded C - Keil Compiler,
- Eagle Software for PCB Designing,

For PC System,

- VB.net 2008 Based Application Software,
- File Handling,
- Serial Communication Protocol,

III. SCOPE OF THE PROJECT

The study is limited to PC to PC Data Transfer of Business Card and Files using Human Area Network. It uses Serial Communication Protocol. Java Micro Edition 2.0 (J2ME) and Embedded C is used for programming. Copper Plates and ARM 7 are used as transmitter and receiver. The system enables file or data transfer through ARM 7 and copper plate.

IV. APPLICATIONS

There could be several applications of IBC. Few of them are listed below:

1. Reduces a huge number of sensor wires around patient in ICU. Patient with number of wireless sensors with inbuilt Red Tacton chip on body which gives connectivity to the system. Data signals from the red tacton chip comes to the system and thus is analysed [9].
2. **Easy print**
Printer with in-built Red Tacton Chip and user with Red Tacton chip in-built in the cell phone. Now if the user wants to print a file, he will simply select the file from the cell phone and touch the exposed Red Tacton chip on the printer. The file gets transferred through the body to the printer and gets printed[6].
3. **Security Purpose:**

User wants to open the locked door whose handle is with in-built red tacton chip. The user will simply hold his phone with in-built Red Tacton chip in one hand and touch the handle with his other hand. The door gets opened [6].

4. Easy transfer of data:

Two people want to share the data in their mobile phones with in-built Red tacton chip. The data can be sent by selecting the data on one phone and just by touching the body of another the data gets transferred to the other phone.

V. CONCLUSION

Innovative communication technologies for data exchange between on-body and handheld devices are emerging. Intra-body communication utilizes the human body as part of the transmission system; the body becomes the transmission medium for electrical signals. Among the body transmission principles, the method of galvanic coupling is the most promising principle for interconnecting devices. Alternating currents are coupled into the human tissue by copper pad and detected at other body locations as a potential difference by a second copper pad. In this dissertation implementation of Human Area Network for transmitting data between two mobile handsets is demonstrated. The induced data rate is 9600 bps, and the peak current is limited to 10mA. This demonstrates the ease of implementation of such technology. This technology can be used for various other applications. Using the technique demonstrated we can have secure, Low power consuming and device independent communication channel. Some of the applications of this Technology are-

- Communication between two devices with same user
- Communication or data transfer between two people when they shake hands

VI. RECOMMENDATIONS FOR THE FUTURE RESEARCH

Although we have discussed the topic and research done so far extensively; there is scope for improvement in this field. One of the key concern for Human Area Network is the behaviour of such communication when Human Body is in motion. As body movement severely impacts the received signal strength [8]. Also, research needs to be done on data transfer rate variation due to body movement. This is critical since most of the practical implementation of this technology will involve body movement.

The success of many new technologies has been driven by standardization. Standardization drives adoptability and helps by making devices interoperable. It also drives down cost of owning the technology or devices. Interoperability, user convenience & low cost are critical success factor for any technology in mass market. Standardization of Human Area Network protocol will help in driving its growth.

Since, Human Area Network involves passing signal through human body. It is critical to have extensive medical studies and clinical trials done. This will help in securing support from medical field for this type of communication which will be critical for mass adoption.

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