



Data Transfer Through Human Body Using python

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ABSTRACT

Technologies enabling communication between people and devices in close proximity are required for all modern user-friendly gadgets. This paper demonstrates a design and implementation of Human Area Network technology that enables communication through human contact. Communication between mobile terminals and terminals that are embedded in the environment has become important. Use of cables is inconvenient as they can get tangled and are difficult to manage when used in communication between devices which are in close proximity. When very weak radio signals are used for the communication, data speeds are reduced by packet collision in crowded places such as exhibition sites. There is also security risk from unwanted signal interception. For solving such problems we use body of a person as a signal path for communication. A transmission path is formed automatically when a person comes into contact with a device and communications between mobile terminals begin. This concept will reduce load on other communication channels by introducing new communication mode.

Keywords: Human Area Network (HAN), Wireless Protection Access, Personal Area Network, Intra Body Communication

INTRODUCTION

Currently, the field of Wireless Technology is undergoing unprecedented growth. We have many exciting new technologies such as Wi-Fi, Bluetooth, and Infrared etc. This technology can transfer data at very good speeds. But all this technologies have their drawback such as limited line of sight, excessive power consumption, possibility of signal interception during transmission, low throughput etc. In order to overcome these drawbacks the emerging concept of Intra- body communication can be used.

According to a plethora of scientists the human body is a very good conductor of electricity. Our project Data transfer through Human Body uses the concept of intra-body communication in order to transmit data through the human body. The transmission of data is commenced as soon as we touch the touch screen on both ends. It utilizes the humanbody as a safe, secure and efficient means of transferring data from one device to another. Intra body communications can be used to communicate with devices embedded in our daily environment as well like password door locks, cars, mechanical instruments etc. The concept of Intra Body communication was first proposed in 1996. In Intra body Communication need for cables is eliminated. It is also more secure compared to wireless communication since signals are not radiating in the surrounding environment and hence are not prone to interception. Communication is happening through human body and hence it is easy to control start and stop by just removing contact with human body.

Today demand for wireless network has increased tremendously. Devices like cellular handset, PDAs, MP3 Player and digital cameras have become very popular. A person can have multiple devices at same time. This increased proliferation of devices requires a technique to communicate between these heterogeneous devices. There are various communication methods which are available such as Bluetooth, wireless LAN, Zigbee and UWB. There have been numerous efforts to reduce power consumption of these methods. Low power consumption is essential since majority of the devices mentioned above are wireless/mobile. Modes mentioned above require power since they have to modulate signal to carrier frequency before transmitting. Also, they require setup time and effort. The Human Area Network is prime candidate for this since it requires low power and setup time

Our motivations are to create the new mode of communication needs to be easy to use, easy to implement and cost effective, system will be able to utilize Human Body as a conductor for data transmission, proposed system when implemented commercially will help in connecting various devices without any additional setup, proposed system will also help in reducing Load on other communication channels by introducing new communication mode.

In introduction we have the future scope of the proposed system and will the proposed system act as a new medium of transferring data.

LITERATURE SURVEY

In this concept of communication method called as Intra-body communication for security enhancement in various fields especially in the military. In this concept, medium of transmission of data will be human body. The complexity of existing technologies that involves cables, wire connection for transmitting data are eliminated by the use of this technology. The author has proposed model that provides a secure and efficient communication system that consists of wearable devices for authentication and also useful for transmitting the data to the master device in real time. This model proposed is easy to be wearable on the wrist or any other part of the body which has an integrated processor as well as galvanic coupling is a method in which insulating material (copper) allows the intra-body communication. This method uses human body which has improves the security of transmitted signals as compared to the other wireless technologies.

A. PROBLEM DEFINATION

From the background and literature covered in above section we can clearly identify need for a new communication system. In this paper "Body area Network" data is transferred using Human Body as a conductor.

The current will pass through our body in small amounts (i.e. a few millimeters) while transmitting data from one touch screen device to another touch screen device. Selection of a video, a picture or simple message can be made and then we can send data to the receiving touch screen device and human body as a medium of transmission.

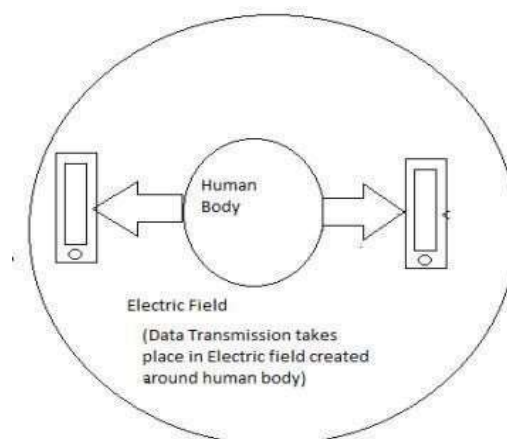
When we increase small voltage, that voltage then circulates inside the body and can be captured, allowing it to move from one hand to the other. A really simple way of explaining it is if you imagine that the body has become a replacement for a USB or Bluetooth connection, wristband. This project focuses on keeping the human body only as a medium and no use of chip or wristband.

EXISTING SYSTEM

Apart from these, methodologies using IBC also exist. One such technology is called the RedTacton. In this, data is transmitted inducing fluctuations in the minute electric field on human body surface. Receiver section consists of a photonic electric field sensor which combines an electro-optic crystal and laser light to read the data. Electro-optic crystal has a property to change its own optical property with respect to the changes in a weak electric field. The crystal senses changes in the weak electric field on the surface of the body caused by the transmitter. Laser detects those changes in the optical properties of an electro-optic crystal, converts the result to an electrical signal in an optical receiver circuit as shown in the figure 1.

The fig 1 below illustrates the working of the existing method of Intra Body Communication which is termed as RedTacton. As shown in the figure in this method the data is passed with the help of electric field on the surface of the human skin. Also this methodology is entirely dependent on the availability of crystals which can be quite an expensive deal. The fig 1 illustrates the working of the existing method of Intra Body Communication which is termed as RedTacton. As shown in the figure in this method the data is passed with the help of electric field on the surface of the human skin. Also this methodology is entirely dependent on the availability of crystals which can be quite an expensive deal.

The topic drawbacks of Existing system explains drawbacks of RedTacton.



DRAWBACKS OF EXISTING SYSTEM

As mentioned earlier the existing methodologies mostly consist of wired and wireless communications. Wired communication is very efficient and reliable. It is also relatively cost-effective, as the price of cabling – even at the lengths needed to cover an average office – is pretty cheap. But these

technologies, such as the twisted pair copper wire, co-axial cable, fiber-optic cable, etc come with their fair share of drawbacks. The biggest and the most important drawback of wired communication is the lack of portability.

Since these technologies use wires for data transfer they cannot be used on the go. We may need sockets and all other kinds of infrastructure for utilizing this method of communication. Also, wired technology products, such as desktop computers, take up more space than equivalent wireless options. Wires, cables and multiple components require more desktop space than their wireless counterparts. Office-furniture decisions and employee-space allocation must account for the added space needs of wired computer and technology products.

So to summarize, although the existing technologies are quite fast and efficient they have some serious drawbacks. The most important drawback of existing communication technologies is the lack of absolute security. Although wireless technologies are not too easy to hack into, since the signals propagate through air they can be intercepted by hackers. Although these security protocols provide adequate security, they are still not impenetrable. The case with Bluetooth is quite similar. As mentioned in the Introduction, a method of Intra Body Communication termed as RedTacton also exists. Since it uses IBC, unlike other wired and wireless networks it is fully secured. The data only passes through the human body, hence it is impossible to intercept. RedTacton works by using the electric fields present on the surface of human skin for the transfer of data. The main drawback of using this method is the cost. This method relies on the principle that the optical properties of the electro-optic crystal varies according to the changes in the weak electric field. It detects the changes in the optical properties of an electrooptic crystal using a laser beam and converts the result into an electrical signal a detector circuit. Hence the working of this method is totally dependent on the availability of certain kind of electro-optic crystals which can be quite expensive. Also the RedTacton technology can be a potential risk for people with medical problems,” says Benny Bing, associate director of the Georgia Tech Broadband Institute, in Atlanta. “Electric field signals traveling though the body—no matter how small these signals are—may trigger a heart attack or a stroke.” He points out that some people still have a phobia about holding cellophanes close to their heads, despite plenty of studies that show there is very little to worry about.

The topic proposed methodology will explain the proposed system that is Data Transfer through Human Body’s working method.

PROPOSED METHODOLOGY

As was mentioned before the human body is a good conductor of electricity. By using the project we can capitalize on this fact. In normal conditions the human body offers a resistance of about 10,000 ohms, but it can be even greater if the person is dehydrated. For the safety of the body the current should be limited to 5mA to 9mA. Also the maximum voltage that the human body can safely take is 5V.

In our proposed methodology, as shown in fig. 2. We will use touch screen on both the sides. Since they are transceivers, the device can provide efficient full-duplex communication. Both consoles are made of touch screen and esp32. When we touch the touch screen on both sides the circuit is completed and the data is transferred. The data can be a text file, audio, video etc. The data in the form of string is converted into digital voltage signals with the help of micro- controllers.

Also, both sides have Touch screen which acts as the sensor to transfer data through his/her body. We have used Linux operating system with esp32 and for user interface we have used Java Programming Language. In this application user will have choice for sending and receiving text or images and video.

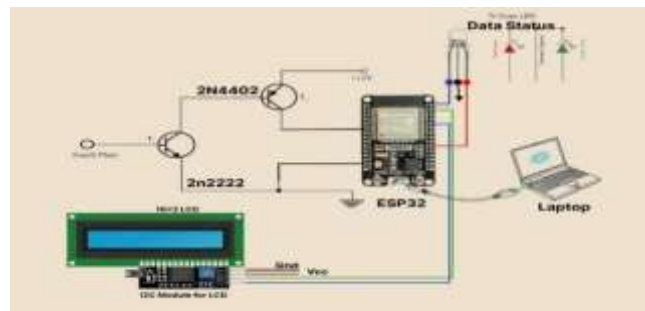


Fig. 2 Circuit Diagram

The sender and the receiver are the Esp32 model First we have to study how much current human body can resist. In normal conditions the human body offers a resistance of about 1000 ohms, but it can be even greater if the person is dehydrated. For the safety of the body the current should be limited to 5mA to 9mA. Also the maximum voltage that the human body can safely take is 5V.

In our proposed methodology, we will use touch screen on both the sides. Since they are transceivers, the device can provide efficient full-duplex communication. Both consoles are made of touch screen and Esp32. Esp32 is used to provide operating system to both consoles. Using Java programming language (JAVA SE), Graphical User Interfacing (GUI) is created.

When we touch the touch screen on both sides the circuit is completed and the data is transferred. The data can be a text file, audio, video etc. The data in the form of string is converted into digital voltage signals with the help of Esp32. The console on the sender side has the send button that converts the digital data signal to analog data signal (DC to AC conversion) and the receiver side has the receive button that converts the analog data signal back to

data signal (AC to DC conversion), when user touches on this buttons simultaneously. DC to AC and AC to DC convertor code is created using Java programming language (JAVA ME). The two Esp32 are used for sensing the touch of the human body to start the data transfer. One Esp32 is to be set on 5Volts or below 5 Volts and the other Esp32 has to be set on ground level (0Volts). By making such settings of the send and receive button both will act like sensor and pass the data through the human body.

The working of proposed system. Data is transferred using Human Body as a conductor. Transmitting side touch screen device is connected to Esp32. Esp32 provides the signal to a touch screen. User touches his body to this touch screen. Similarly receiving side Device is connected to another set of Touch screen and Esp32. User touches his body simultaneously to Receiving touch screen.

The proposed system will be made up of Esp32, TFT touch screen. The human body will be the transmitting medium for the proposed system. The Esp32 will need a constant power supply for that we need a power bank or Lippo battery. The receiver and transmitter on both the sides will look like this as shown in the figure 3.

The operating system loaded into the TFT touch screen in our system is Linux which is open source and the SD card used is 16GB to load

operating system. Esp32 is used. For the user interface java programming language is used. At the sender and receiver side the device contains Graphical user interface application which gives a choice to select whether you want to send data or receive data as shown in the Fig. 4.

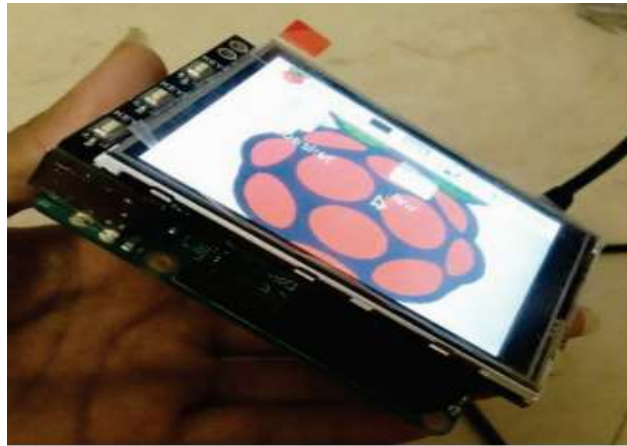


Fig. 3 Sender/Receiver console



Fig. 4 Graphical User Interface Application.

After selecting send or receive button you will have 3 choice text, image and video as shown in the fig.4. You have to select one option that you want to send or receive.

If you want to send text message then click on text button, after clicking on text button you will get one Text Area to type a message as shown in fig. 5. And then click on send button to send message from device to human body.

This interface will allow the user to confirm the send and receive commands given at the time of transmission or receiving the data. The user sometime clicks the send or receive button by mistakenly. Thus the confirmation interface is a must to handle such minor human errors.



Fig. 5. Send/Receive interface.

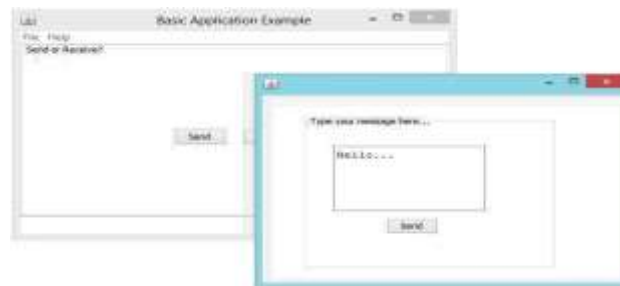


Fig. 6 Send interface.

CONCLUSIONS

Compared to some of the other recent communication technologies our proposed system Body Area Network is comparatively better in the sense of cost and security. We examined various ways of communication such as wired and wireless but finally came to the conclusion that both of these have their share of drawbacks. While wired communication is quite secure and reliable with minimum data loss it's not very flexible and portable. Wireless communication overcomes the flexibility issue but it is quite vulnerable to signal interceptions. We are also the working of the proposed system and its advantages over the existing system. Finally we explored some of the most promising and unique applications of Data Transfer through Human Body.

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