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M2m Communication Using Human Body as Network

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Abstract: ***Human area network is a novel data transmission method that uses the human body as an electrical channel. The idea is driven by the vision of a cable-free secure data transmission system. The human body is characterized as a transmission medium for electrical currents by means of the dielectric properties. This paper describes a data transmission technology that enables communication by touching, a technology we call SPARSH. Because of the routing of cable problem the communication between terminals is clearly inconvenient. When transmission of data takes place over the radio channel, data speeds are reduced by packet collision and the security risk from unwanted signal interception is another problem. A technique for solving such problem includes the use of the person body as a signal path for data transmission. The transmission of the data takes place when the human body comes in contact with a device and communication between mobile terminals begins.***
Keywords: Intra-body Communication, IBC, HAN, Mobile Communication, wireless communication, M2M communication.

I. INTRODUCTION

In today's world transmission of data is performed over a wired network or wireless network. The drawback of the wired network is the routing of the cable. The drawback of the wireless network is packet collision and security risk. But these drawbacks are eliminated by using the proposed system in this paper. IBC was originally proposed by T. G. Zimmerman [1]. The concept is to use a human body as communication channel between mobile device terminals. The concept of Personal Area Networks (PAN) [2] - Near field IBC is demonstrated how mobile devices near the human body can exchange digital information by capacitive coupling in pico- ampere currents through the human body.

In the year 2013 MirHojjatSeyedi [3] et al done a survey to examine the ongoing research in the area of Intra-body communication for body area network applications and gives IBC fundamentals, IBC mathematical models of the human body, IBC transceiver designs. It is found that IBC is a new short range non-RF wireless communication technique specified by the IEEE 802.15.6 using the human body as a transmission medium. As it stands, the IBC technique potentially provides a more power efficient and naturally secure short range communication method for body area networks, compared to wireless RF. Despite the tremendous benefits, the evolution of IBC is still in its infancy.

Zimmerman [1] said that, the near-field communication can operate at very low frequencies and low transmission power. The prototype of the PAN transmitter operates at 330 kHz, 30V, with a transmission power consumption of 1.5mW for charging the electrode capacitance. Direct couplingby Masaaki Fukumoto [2] et al is a modified version of the basic capacitive method. The system operates by analog frequency modulation at frequencies within 50 kHz to 90 kHz for transmitting a simple protocol of ID numbers. Sasaki [9] et al tried to illuminate the principles of intra-body communication, where the Electro Optic [EO] sensor is used to receive data signal. Maria AmparoCallej´on [4] et al implemented galvanic [5], [6] and capacitive coupling [7], [8] setups and carried out comprehensive set of measurements by analyzing fundamental IBC parameters such as optimum frequency range, maximum channel length and type of electrodes.

II. THE PROPOSED SYSTEM

A. Hardware Model

The above proposed system will be divided into the following sub modules or sections…

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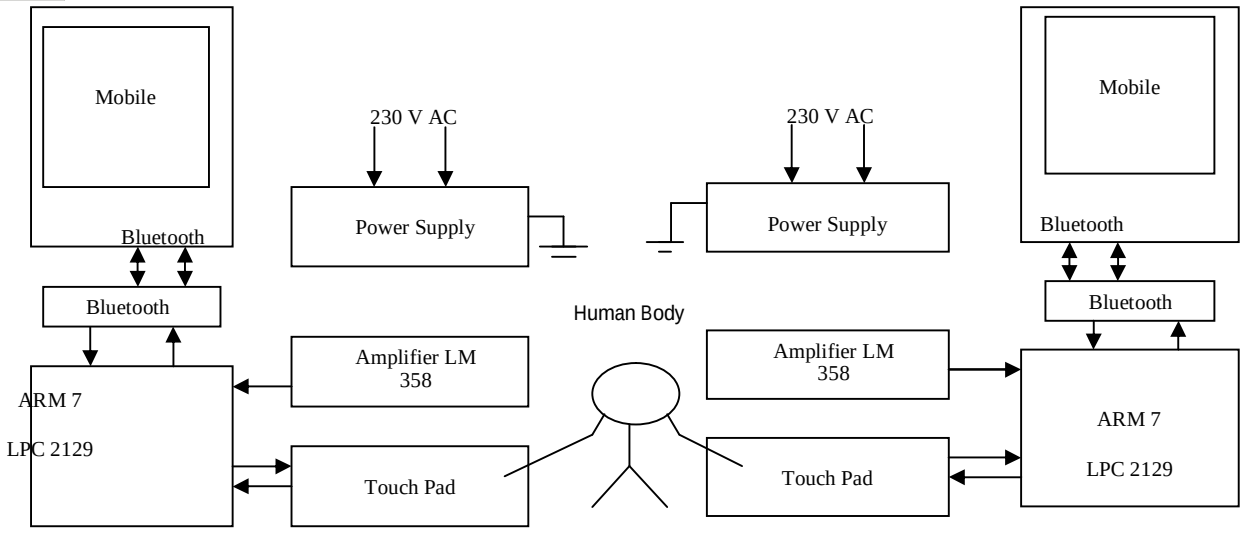

Fig. 1. Hardware Model

B. Explanations of Blocks

The following are the brief explanations of the working principle of the various major blocks or sections used in the system…

1) Bluetooth Bluetooth appears to be a different way to build up connections between devices placed in proximity. This radio frequency technology can be thought as a cable replacement technology that will not only replace cables, but be the base to developed next generation wireless applications, which will be built upon this technology. It offers a variety of other services, apart from connecting devices, and it creates opportunities for new usage models. Here we are using RN-42 as Bluetooth model.

2) Mobile Phone In this device we are creating application for the communication of the Bluetooth device and for the GUI interface for the user to send the data and check the received data. Here we are using JAVA ME platform to create the application.

3) Power Supply This 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.

4) ARM 7 This unit is the heart of the complete system. It is actually responsible for all the process being executed. It will monitor & control all the peripheral devices or components connected in the system. The controller here user will be of LPC21XX family. The code will be written in Embedded C and will be burned or programmed into the code memory using a programmer. This unit requires +3.3VDC for its proper operation.

5) Touch Pad This unit will provide the touching facility. When the person touches the touch pad on both the side it will transfer the data from one end to the other end and it will display on the mobile device.

6) Amplifier This is the device which is used to amplify the received signal to increase the strength of the signal. Here we are using LM358 as amplifier. This unit requires +5VDC for its proper operation.

C. Software Model

We have divided the software model into two parts; one is the mobile side and another is the processor side. For the mobile side we have used the java language with the ADT toolkit and eclipse software, whereas in the processor side we have used the embedded C in the keil software. We are operating software model into two modes, one is the GUI data or personal data transmission and another is the transmission of the file which is resides in the MMC.

D. Mobile side

Define all GUI elements which consist of the some edit text field, radio button for choosing personal data or file transmission, some simple buttons for the data transmission methods i.e. only transmission, only reception or transceiver. Create the GUI element which are defined and fill all the require data in the GUI.Perform the operation to check whether the mobile device has a facility of the bluetooth. This checking can be performed by pasing the MAC address of the device. If yes then establish the connection between mobile device and external bluetooth device. Define the input output stream for the bluetooth. Then click on the ActiveTx or

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DeactiveTx or ActiveRx or DeactiveRx for the data transmission methods. These are the simple buttons created on the GUI for the data transmission methods. For the file transmission write the file address in the provided text field. Create an object named as Active.For the bluetooth transmission check for the BTTransmit Active is true or false. If it is true then check for the TxBusy if it is true then convert the data into one string with some specific format. If it is the personal data then make the string starting with starting with 'M' or if it is the file then make a string starting with the 'F'. Next field in data string is the message length and after that attach the actual personal data or file content. At the last flush the data from the buffer for the transmission. For the Bluetooth reception check whether BTReceive Active is true or false. If it is true the start reception of the data. Check whether the data is personal or file by checking the first field of the received string. Then check the length of the data form the next field. If it is the personal data then display it on to the GUI and if it is the file then store it into the MMC.

By making the data flow diagram shown in fig. 4, a user fills the information in the GUI form or read the file from the MMC through the file handling system in the mobile. Then the data or file is going to be converted in the packets. Those packets are transmitted to the receiver controller through the body. At the time of reception the receiver controller receives the data from the body. The received data is decoded and if the data is information then it will send to the GUI and it will display on it. If the data is file then it is given to the file handing system and stored into the MMC.

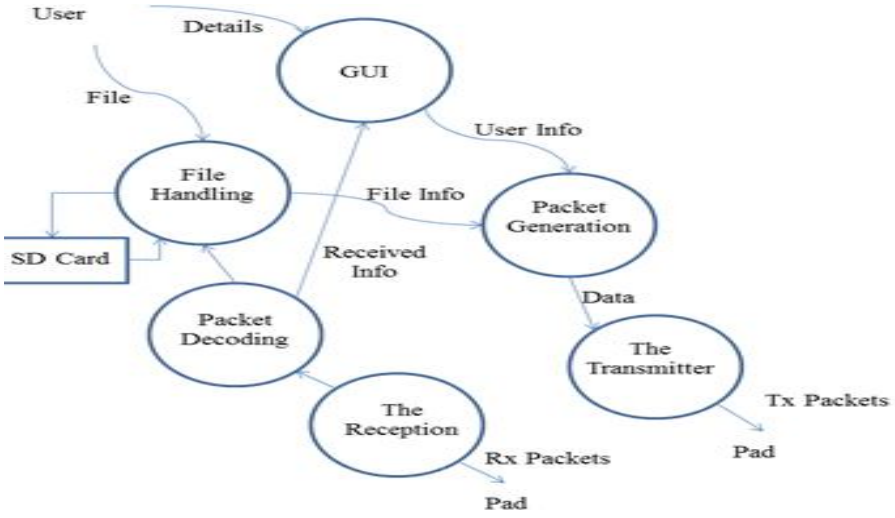

Fig.2. Dataflow diagram for mobile side

III. RESULT AND CONCLUSION

By creating the GUI elements we can transmit the personal data or some file which is in the MMC. Give the data path of the file for the transmission of the file or fill the GUI data for the personal data transmission. First select the ConnectBT button to check for bluetooth availability if it is available then the connection is establish between the mobile device and the external hardware. Secondly select the ActiveTx, DeactiveTx, ActiveRX or DeactiveRX according to the data transmission mode whether you want only reception or only transmission, or transceiver.

Here the data transmission is depends on the packet size of the data and the input output buffer size. Here we have developed the methodology f or the data of 255 byte. The probability of the reception of proper data is depends on the reference level of the amplifier. The distance between two mobile devices for the data transmission is depended on the amplification of the signal. We can transmit the data over the 9600 baud rate.

The main achievement of this methodology is by using only one wire (body) the full duplex transmission is possible. And the socking related problem is not possible because the whole system works on lower DC voltage.

IV. FUTURE ABSTACTION

Here in this paper we have developed the external hardware to transmit the data from one mobile device to another mobile device. But in the future we can develop the mobile phone with this inbuilt facility. We can also provide some option for the data transmission and some security. The mobile devices will not transmit the data without user's prior permission. To transmit the data between two devices with the increase data rate and increased buffered size. This may also be expands to transmit the audio, video or image file.

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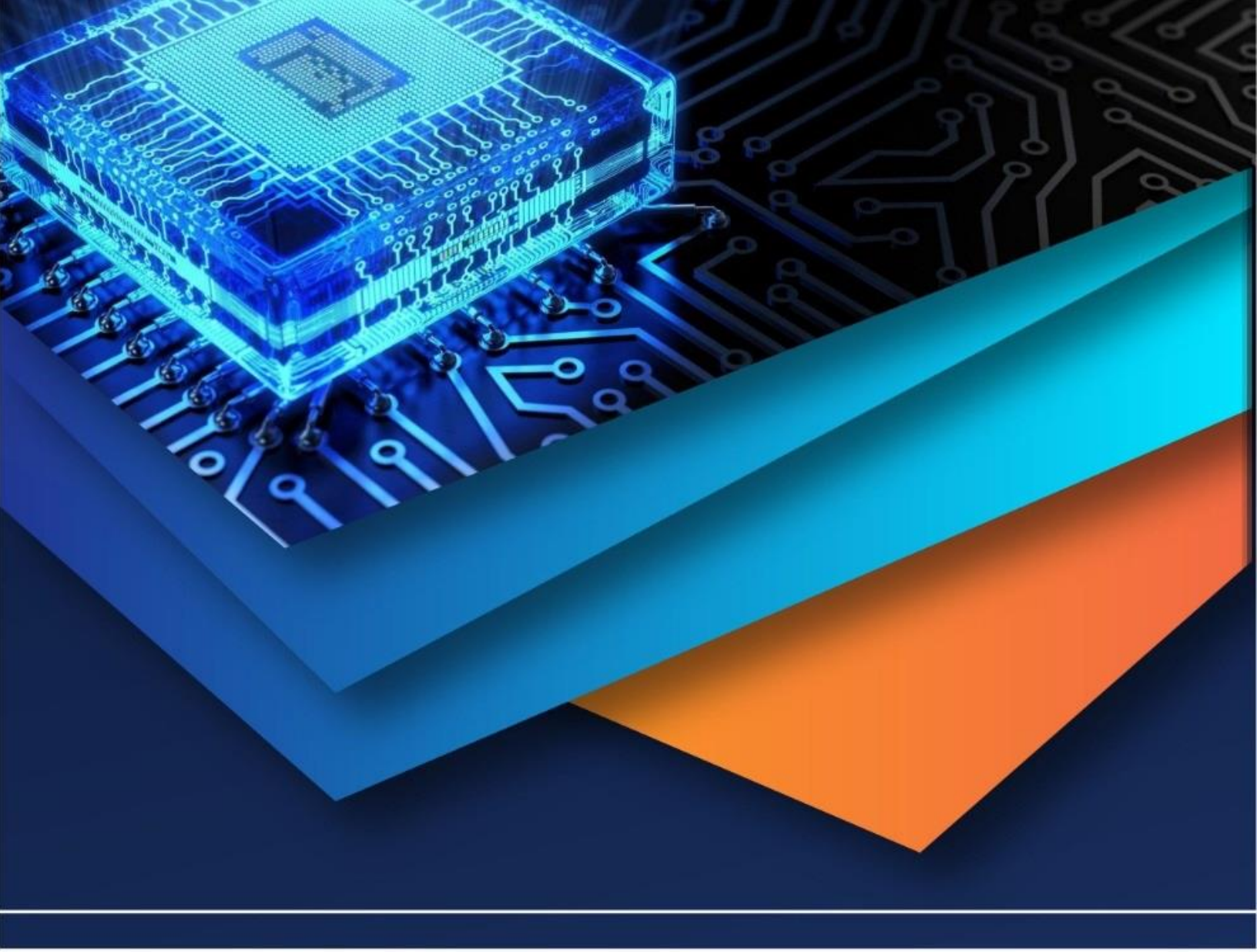

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