Body Through Data Transfer

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Abstract—The field of technology is constantly evolving to process larger data sets and maintain higher levels of connectivity. At the same time, advances in miniaturization had increased mobility and accessibility. We present a device designed with a short range wireless connectivity technology that uses the capability of human body to transfer few signals for safe and smooth communication between two electronically compatible devices. Our objective is to implement one touch data transmission technique using simple object oriented programming language. The system we intend to develop is easy to implement and cost effective. The system is based on advanced RISC architecture. It can be modified to develop new or improve existing products.

Keywords: Miniaturization, wireless connectivity technology, electronically compatible devices, RISC architecture.

I. INTRODUCTION

Intra body communication was first proposed by Zimmerman. In this type of communication human body is used and a communication channel among various devices. We live in a connected data intensive world today. Each person has various handheld devices such as cellular device, tablets, digital cameras, pocket games, notepad etc. Intra body communication can be an important tool for communication. The field of technology is constantly evolving to process larger data sets and maintain higher levels of connectivity. At the same time, advances in miniaturization had increased mobility and accessibility. Body through data transfer represents the natural union of connectivity and miniaturization. It is defined formally as a system of devices in close proximity to a person's body that cooperate for the benefit of the user. Communication between the devices occurs when they are within a few centimeters of the human body: a simple proximity or touch detection can establish a system connection. The basic function is to detect a touch, establish a connection, encode and transmit the information and receive and decode the information. Its objective is to provide access control, personal safety and security, medical monitoring and consumer profile management. In Intrabody Communication need for cables is eliminated. This reduces the hassles of managing various cables and connectors for each device. 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.

Manuscript Received on January 2015.

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Communication is happening through human body and hence it is easy to control start and stop by just removing contact with human body.

II. MOTIVATION

- A new mode of communication needs to be developed which is easy to use and can connect multiple devices.
- It needs to be easy to implement.
- Create a device which is affordable.
- Proposed system will be able to utilize Human Body as a conductor for data transmission.
- The system will be implemented using Open source object oriented program for easy and faster implementation.
- The system will also help in reducing load on other communication channels by introducing new communication mode.

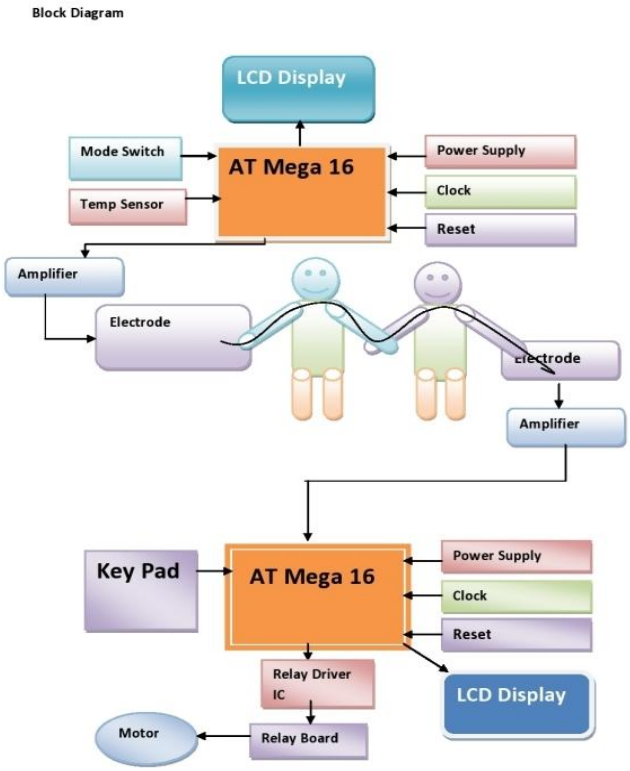

Figure 1: Basic block diagram

III. BLOCK DIAGRAM

The system in accordance with the present invention comprises a transmitter adapted in use to be worn on the user's body and a receiver adapted to be connected to associated equipment which utilizes data transmitted from the transmitter.

The transmitter comprises a battery energizing the circuit, a ground electrode for direct contact with the user's body to establish an electrical connection through the user's body to a ground, and a signal electrode spaced from the ground electrode for direct contact with the user's body. Also, the transmitter includes the microcontroller which is energized selectively by the battery for converting the first data into a first modulated voltage signal; the transmitter applies the first modulated voltage signal across the signal electrode and the ground electrode. The receiver and transmitter have a common ground. The receiver includes a start signal generator which generates the start signal and provides it through the touch electrode, and a touch sensor which is connected to the touch electrode to give a touch signal when the touch electrode is touched by the user's body. The transmitter and receiver remains deenergized until the user touches the electrode, thereby saving energy during non-operated condition and assuring a prolonged battery life. The transmission of the data can be made simply by touching the electrode and without requiring any additional starting procedure. This is particularly advantageous in a case where the transmitter is realized in the form of a battery operated wrist watch for use in a keyless entry system for access to a vehicle, restricted equipment, and restricted area. One of the electrodes is coated with an insulation layer for making capacitive coupling with the user's body, avoiding the occurrence of electrical double layer at the interface between the user's skin and the electrode which would cause electrical polarization, the source of undesired noise.The transmitter and receiver additionally include a LCD for indication of the data.

Programming the ATMega16 Microcontroller:

We have decided to program the micro-controller using the Embedded C language. Some of the advantages of this language are:

- Easier to learn,understand,program and debug
- C compilers are available for almost all embedded devices in use today
- Supports access to I/O and provides ease of management of large embedded projects
- C has advantage of processor-independence and is not specific to any particular microprocessor or microcontroller or any system

Programming language: Visual Basic 6.0

We have decided to use Visual Basic 6.0 because of its following features:

- Both simple and complex GUI applications
- Simple programs without writing much code
- Component Object Model (COM)
- Object oriented support
- Strong integration with the Windows operating system

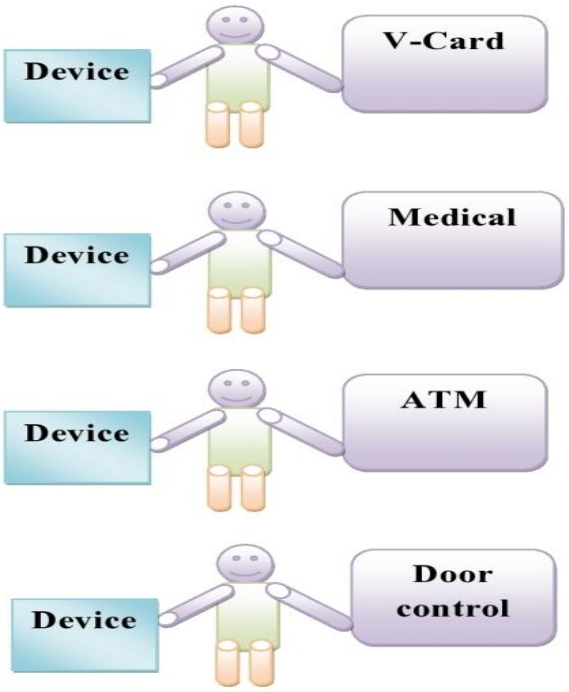

Figure 2: Modes of operation

IV. MODES OF OPERATION

The Mode selector gives us four operations for visitors card, medical, ATM and door control. For every mode the ATmega16 microcontroller is responsible for processing the input. The temperature sensor is used for medical application to check the temperature of the patient. The LCD at the transmitter displays the selected mode while one at the receiver helps to observe the output for the different modes. For visitors card mode the card number and authentication number is displayed. For medical mode the temperature and blood group is displayed. For ATM mode it asks for the PIN, if approved it displays 'Correct Password'. For door control, the transmitter has a unique ID. The receiver is attached to the door. If the user is authenticated the plunger attached to the door pulls back and entry is allowed after which the plunger again goes back to the closed position. The plunger does not pullback without authentication and thus increases the security.

V. ADVANTAGES

- Low power consumption
- Long battery life of the system
- Fast system response
- Stable and robust communication.
- Near field data communication (as little as a few centimeters)
- Security management and access control
- Operator authentication
- Low cost and complexity

VI. CONCLUSION

We have presented the design and implementation of a technique to transmit information through a capacitive touch via the human body. Our experiments show that this is feasible even with an off-the-shelf touch system, albeit at very low bitrates. Its objective is to provide access control, personal safety & security, medical monitoring and consumer profile management. It is a low-cost, secure and easy to implement short range wireless communication with low power consumption. While some reliability challenges remains, it is possible to achieve up to 5-10 bps with a wearable transmitter electrode. Transmission of information via small physical tokens can be used to distinguish who is interacting with a mobile device, and can be useful for parental control, multiuser games (particularly when played on a single device), and possibly play a role in authentication solutions in future. We believe that significantly higher data rates could be achieved by designing receiver capabilities into touch screens and few of this work as a first step towards exploring how this touch sensor can participate in the exchange of information between mobile devices.

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