Body Area Network Based Smart Secure Communication System for ATM

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Abstract -   **This paper presents the application of Intra Body Communication system to establish a secure communication channel between a wearable device and Model ATM machine. Red Tacton is a Body Area Networking concept which is coined between wired and wireless, Which enables communication through human body as a transmission medium in turn uses the feeble electrical fields generated from the human body which is harmless, safe and fast. With Advancements in Communication, protection also becomes an integral part and this requirement has resulted into creation of many authorization tools such as card readers used in ATM, user pin codes etc. But since these tools were not secure enough, We propose unique solution using Body Area Networking concept which transfers data using the human body as its conductor, Instead of using radio transmission thus maximizing the security of transmitted signals . The Transmitter (Wearable device) module generates frequency signal corresponding to unique ATM ID and can be transmitted through Human body to BAN receiver (Model ATM machine) for detection and further processing. If the signal matches the unique ATM ID then the user is allowed to enter 4-digit password to access his/her account, If the entered password is correct then user need to enter the OTP which has sent to his mobile for higher security. Once the OTP is entered he/she gets access to his/her different bank accounts at single point of contact. This project proposes BAN based smart secure Communication System for ATM.**

Keywords: **ATM,Body Area Networking(BAN),Red Tacton**

I. INTRODUCTION

Intra Body Communication was first proposed by Zimmerman [1].In this type of communication Human Body is used as Communication channel among various devices. All researches reported these technologies have two limitations. They are 1) Operation range through the human body is limited to a few tens of centimeters. 2) Communication speed is only 40 bits/s. These two limitations are overcome by Japanese NTT by introducing the ―RED TACTON which means―Touch-Act-On that means action triggered by touching device. It uses IEEE 802.3 standard to achieve a data transfer rate of 10 Mb/s. REDTACTON transceiver uses the electric field emitted by surface of the human body to transmit the data into digital messages signal. Existing communication technologies range from wired to wireless medium. Wired communication happens using public switched telephone lines while Wireless communication refers to the methods of carrying data through the air or space using infrared, radio, or microwave signals. Wireless communication is better as

compared to wired communication in terms of extra overheads required for establishing an end to end communication between the two end points. In wireless media, there is a sudden decrease in speed of transmission especially in multi-user environment leading to network congestion. All the pre-existing technologies suffer from eavesdropping and signal interception. With communication, protection also becomes an integral part. As far as, for secure transmission of data, encoding and decoding can be done. But, this will not serve our purpose when authentication and authorization is required. And this requirement has resulted into creation of many authorizations and authenticating tools such as card readers used in ATM, user pin codes etc. But since these tools were not secure enough, we moved onto biometric access control Systems, wherein we used fingerprints or retina scans of the User [2]. With all this been done, this paper would present you a different way of authorizing the user- "Red Tacton".The paper is organized into V Sections including Introduction. Section II describes the proposed system. Section III describes the Circuit Diagram and its Explanation. Section IV describes the

Working principle and Hardware Implementation. Section V describes the Advantages. At last the paper ends with Conclusion and Future scope.

II. PROPOSED SYSTEM

The Block Diagram of BAN based smart secure communication system for ATM is shown in Figure 1. It consists of BAN Transmitter Section, BAN Receiver Section, Microcontroller unit.
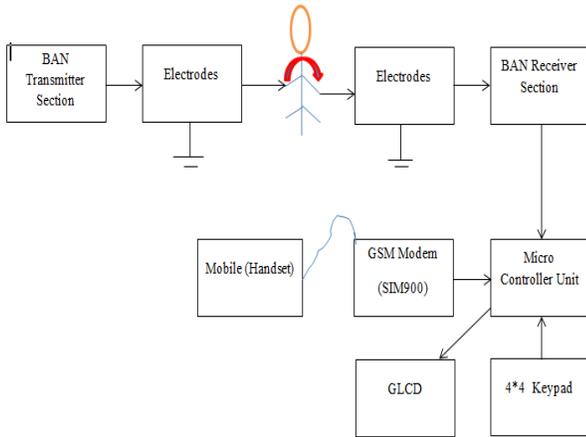

Figure 1: Block Diagram of Proposed System

BAN Transmitter part consists of DTMF Encoder and Microcontroller which generates both valid and invalid frequency signals. These signals are transmitted through human body to BAN Receiver part. It consists of DTMF Decoder which identifies the transmitted frequency signal. If an invalid signal is received and detected then the buzzer starts ringing indicating that invalid person is trying to access the ATM, which in turn stops further processing. If a valid signal is received then only signal is transmitted to microcontroller unit. If controller gets active it switches on the Model ATM machine where predefined options are stored to perform various tasks such as: Enter password, Change of password, New password, etc. After entering the valid password the system pops up saying enter the OTP which has sent to the registered mobile number. If the entered OTP is correct, It asks the user to select the bank which he wanted to carry out

various operations such as, Cash withdrawal, Pin change, Account balance, etc…

III. CIRCUIT DIAGRAM AND ITS EXPLANATION

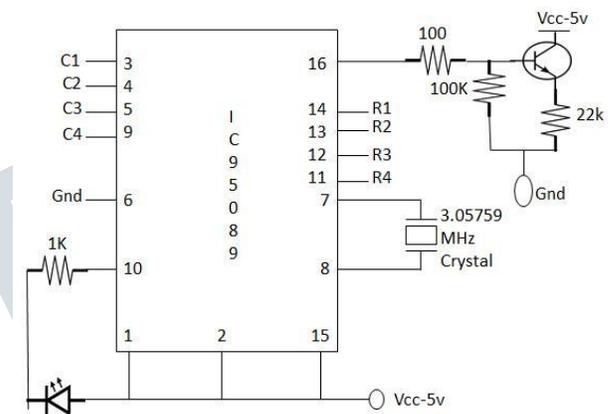The system mainly consists of DTMF Encoder and DTMF Decoder.

Figure 2: Circuit Diagram of DTMF Encoder

The Circuit for DTMF Encoder is shown in Figure 2. A dedicated IC UM95089 is used here to generate different frequencies. This IC is used as Dialer IC in Telephone Instruments. It uses a Quartz crystal of 3.05795 MHz each digit in DTMF (dual tone multi-frequency) code corresponds to a combination of two discrete frequencies, one each from a low and high group of frequencies, which are generated when any switch on a dialer key-pad is pressed. Such a key-pad along with the frequencies associated with each row and column. The key-pad is used in conjunction with a dialer IC to generate the pair of frequencies as mentioned.
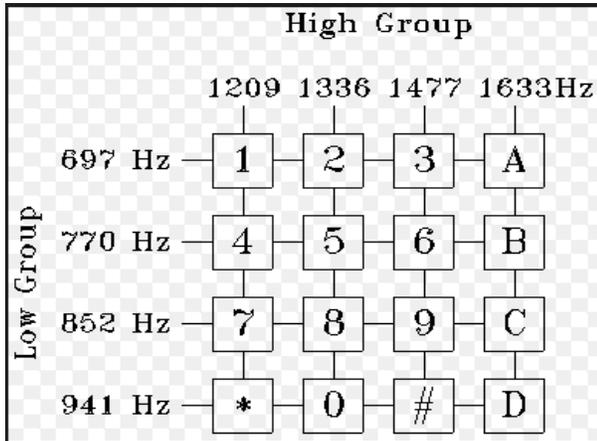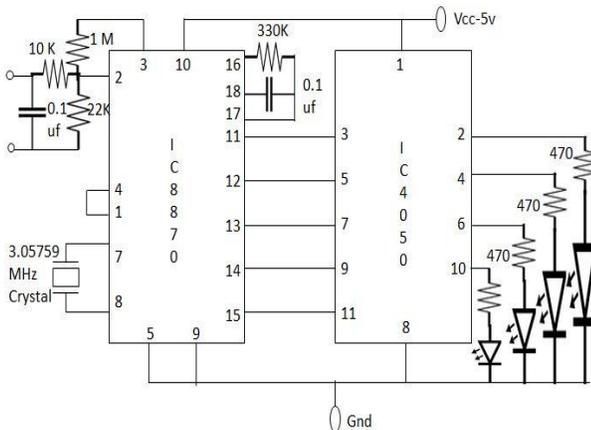
Figure 3: DTMF Key-pad

Figure 4: Circuit Diagram of DTMF Decoder

The circuit for DTMF Decoder is shown in Figure 3. UM8870 IC is used as Decoder IC. The DTMF decoder identifies the transmitted signal. If a valid code is received then only the signal is sent to the Microcontroller unit for further processing.

IV. WORKING PRINCIPLE AND HARDWARE IMPLEMENTATION

In this System the Smart Card (BAN Transmitter part) must be in contact with the Human Body. Whenever the user touches the Copper plate of the BAN Receiver part, Data is transmitted through the Human Body. If valid signal is detected at the Receiver part, Microcontroller unit gets initiated which in turn

prompts the user to enter 4-digit password. GLCD is used to display various actions triggered by the user.
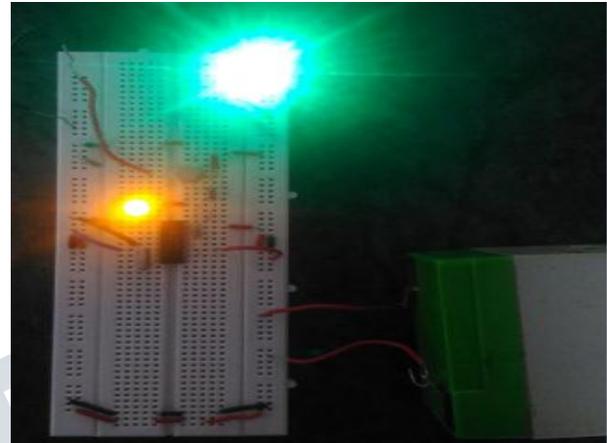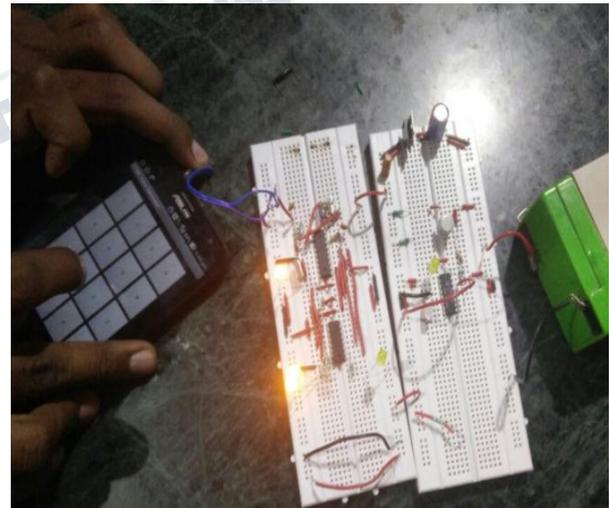

Figure 5: DTMF Encoder Circuitary

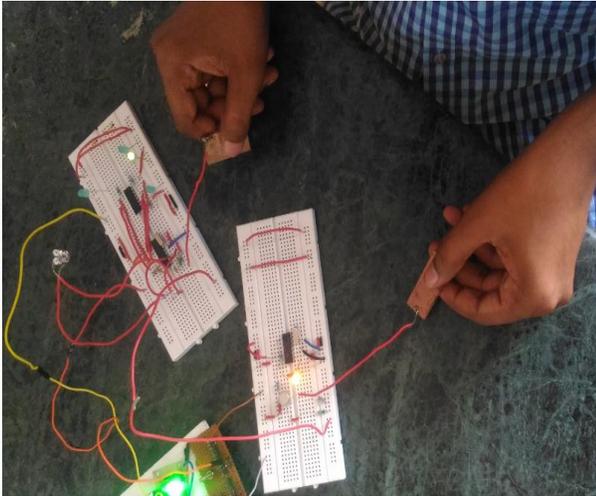

Figure 6: DTMF Decoder Circuitary

Figure 7: Data Tranfer through body

V. ADVANTAGES OF THE SYSTEM

1. It does not require electrode to be in direct contact with the skin [3].

2. Each communication occurs in separate channel.

3. No problem of hackers, it is very hard to pick up stray electronic signals radiating from the body.

4. Consumes very less power in terms of milli volts.

5. Setup time is nil.

VI. CONCLUSION AND FUTURE SCOPE

The work demonstrates the use of Human Body as a Communication Medium for Transmitting Data between two points. One particular frequency is transmitted via human body, if the same is detected at receiving end then the user is valid and necessary actions are carried out. Hardware Implementation is done on Bread Board. Once the user is authorized he/she gets access to his/her bank accounts at single point of contact. This work can be extended by sending multiple signals (frequencies) over the body by adding Micro controllers at Transmitter and Receiver end which in turn enhances the security and reduces the chances of theft.

VII. REFERENCES

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