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Real Time Smart ATM System using Redtacton- Han Technology

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***Abstract*— This paper explores the possibility of providing safe and secure transaction at ATM center using Redtacton-HAN technology. The data is communicated with the machine at very high speed through human body interface. The HAN technology which is still under development has many advantages for communicating with the systems. Here we use the Redtacton technology to communicate with the ATM machines to withdraw or deposit the amount. The RedTacton is a Touch-Act-on which is an action trigger by touching. It uses weak electric field on the human surface of the body as a transmission medium. Now a day's ATM's are becoming very insecure due to many reasons which we are seeing in our day to day life. To have a secure transaction without using the ATM cards the user can access the account with the help of this technology. The HAN technology helps the user to send the appropriate information and there is no need to carry the ATM card by the user for the transactions. Only the authenticated users can access his own account. One advantage we have observed here is, it's very difficult to hack the user account and if the unauthorized user tries to access the account with the Redtacton chip then that account is blocked by sending the SMS to the bank from the authorized person as well as the audio signal is generated to indicate the unauthorized user.**

Keywords— RedTacton, DTMF, voice recording. Microcontroller (89C51), LED, Transformer, Voltage Regulator, Relay, Etc

I. INTRODUCTION

RED TACTON was developed on 30 August 2005 by a seven-person research teamed by Yuichi Kado, executive manager of the Smart Devices Laboratory at NTT's Microsystems Integration Laboratories, in Atsugi, west of Tokyo. Redtacton is a Human Area Networking technology, which is under development that uses the surface of the human body as a safe, high speed network transmission path. It is completely distinct from wireless and Infrared technologies as it uses the minute electric field emitted on the surface of the human body.NTT LAB Which is research and development wing of Nippon telegraph and telephone Corporation from Japan started REDTACTON Technology. REDTACTON Uses the naturally occurring electric fields of human skin to transmit data. According to NTT LAB our hole body is the perfect conductor for electric data. REDTACTON Utilizes a conversation method which takes digital data into stream of low power digital pulses, these can be easily transmitted and read back through the human electric field. The electric field photonic technique which solves the problem of detecting the data from very minute electric field of the human body .The laser is passed through an electro-optic crystal, which deflects light differently according to the strength of the field across it. These deflection are measured and converted back into the electric signals to retrieve the transmitted data. REDTACTON works upon the principle that the optical properties of an electro-optic crystal can vary according to the changes of the weak electric field .NTT developed super sensitive photonic electric field sensor for detecting minute field emitted on the surface of the human body[1] .

RedTacton can achieve duplex communication over the human body at a maximum speed of 10 mbps. The RedTacton transmitter induces a weak electric field on the surface of the body. The RedTacton receiver senses changes in the weak electric field on the surface of the body caused by the transmitter .RedTacton relies upon the principle that the optical properties of an electro optic crystal can vary according to the changes of a weak electric field. RedTacton detects changes in the optical properties of an electro-optic crystal using a laser and converts the result to an electrical signal in an optical receiver circuit. The transmitter sends data by inducing fluctuations in the minute electric field on the surface of the human body. Data is received using a photonic electric field sensor that combines an electro optic crystal and a laser light to detect fluctuations in the minute electric field. [2]

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Using a RedTacton electro-optic sensor, two-way communication is supported between any two points on the body at a throughput of up to 10 Mbps. Communication is not just confined to the surface of the body, but can travel through the user's clothing to a RedTacton device in a pocket or through shoes to communicate with a RedTacton device embedded in the floor. Unlike wireless technologies, the transmission speed does not deteriorate even in the presence of large crowds of people all communicating at the same time in meeting rooms, auditoriums or stores. Because the body surface is the transmission path, increasing the number of connected users directly increases the available number of individual channels. RedTacton can utilize a wide range of materials as transmission medium, as long as the material is conductive and
dielectric, which includes water and other liquids, various metals, certain plastics, glass, etc. Using ordinary structures such as tables and walls that are familiar and readily available, one could easily construct a seamless communication environment at very low cost using RedTacton. [3]

II. BLOCK DIAGRAM OF THE SYSTEM

The block diagram is shown in figure 1. The encoder generates the signal and sends it to the touch plate which is in contact with the human body. When the human comes in contact with the touch plate on the machine, the signal is transferred through the body to the decoder.

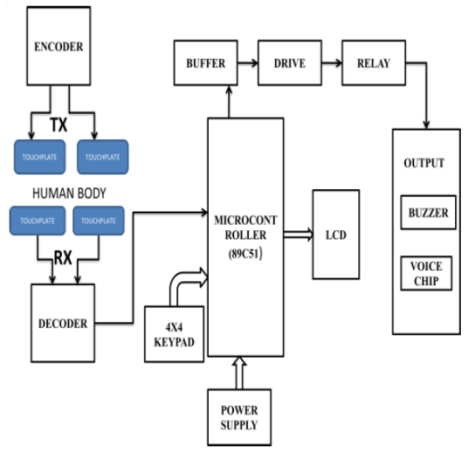

Fig 1: Block Diagram of smart security card system

The decoder, decodes the signal and sends it to the microcontroller. If its an authorized signal, then the LCD display will ask to enter the password, upon verification of which it will display whether or not the entered password is correct. Now if the signal sent is detected as unauthorized by the microcontroller then the buzzer starts ringing and the microcontroller circuit is switched off using the relays. Along with this a RF signal is sent to the receiver which is placed in the nearest police station or the bank

branch. There the receiver circuit has a buzzer on it which will start ringing thereby alerting the authorities.
There is always the question of human safety. How safe this would be for the human health? In real time we will be using RedTacton devices [1] The electrodes of the RedTacton are completely covered so the human body is also completely insulated. The electrons that are present in our body generate something called the displacement current when there is transmission in progress. This is because the body is subjected to minute electric fields. However, such displacement currents are very common everyday occurrences to which we are all subjected. RedTacton conforms to the "Radio Frequency-Exposure Protection Standard (RCR STD-38)" [6] issued by the Association of Radio Industries and Business-es (ARIB). The levels produced by RedTacton are well below the safety limit specified by this standard. [2]

III. CIRCUIT DIAGRAM AND ITS EXPLANATION

The Circuit Diagram of the system consists of:

- DTMF encoder
- DTMF decoder
- Driver and Buffer
- Main Control Unit A.DTMF Encoder and Decoder

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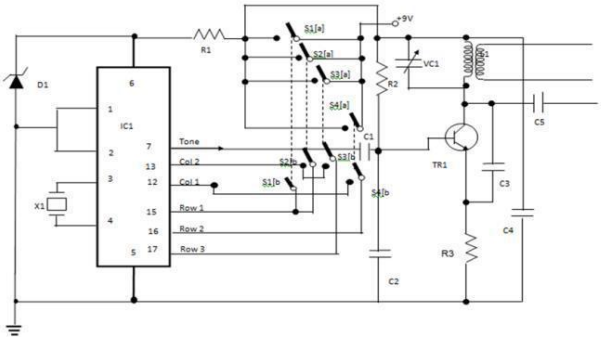

fig 3.1: Circuit Diagram of DTMF encoder

The DTMF encoder encodes the signal and is transmitted to the DTMF decoder. The transmission medium that is used is the human contact with the help of touch plates. The touch plates used are of Copper material. The DTMF encoded signal is given to the touch plate which has been suitably mounted on the body. The receiving touch plate is on the receiver side that is on the ATM machine. The user has to make contact with this touch plate for authentication from where the signal is sent to the DTMF Decoder. The DTMF code being used is in the form of BCD as a DTMF to BCD converter is used before transmission. Hence the decoder receives signal in the form of BCD or hexadecimal which represents a combination of frequencies.

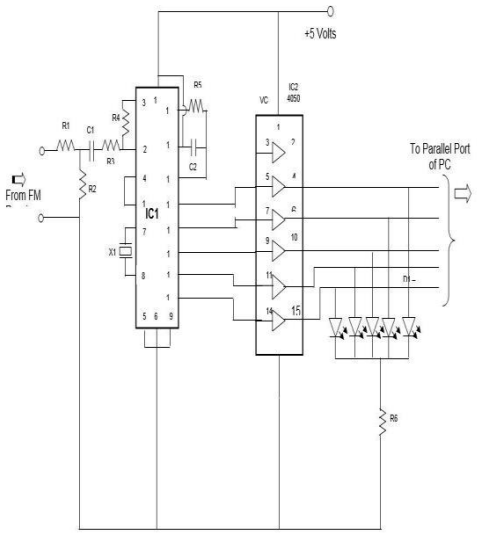

Fig 3.2: Circuit Diagram of DTMF Decoder 978

The circuit shown in Fig 3 uses DTMF decoder UM 92870 IC.The DTMF decoder identifies the transmitted signal. If a valid code is received then only the switch sends the signal to the microcontroller, the microcontroller used is 89C51.

B. MICROCONTROLLER & SUPPORTING PERIPHERALS

The microcontroller we use is 89C51. The 89C51 is of the Intel 8051-compatible family of 8 bit microcontrollers (iaCs) manufactured by the Atmel Corporation. It is a general purpose microcontroller. It has a industry standard instruction set, and low unit cost and it is based on the Intel 8051 core. This allows us to reprogram the IC as and how we wish. This microcontroller houses the main ATM code, which is to ask for the PIN and to authenticate the user. We use a specially designed power supply to get the +12V and +5V regulated voltages to run the whole setup. The power supply plays a very important role in smooth running of the connected circuit. The main object of this 'power supply' is, as the name itself implies, is to deliver the required amount of stabilized and pure power to the circuit. The power supply that we are using has 4 stages. The stages being Step-down Transformer, Rectifier Stage, Filter Stage and the Voltage Regulation Stage. We use the IC4050 HEXBUFFER. The logical state of a digital signal is not affected by the Buffer. Buffers are normally used to provide extra current drive at the output, but can also be used to regulate the logic present at an interface. And Inverters are used to complement the logical state (i.e. logic 1 input results into logic 0 output and vice versa). Also Inverters are used to provide extra current drive and, like buffers, are used in interfacing applications. This 16-pin DIL packaged IC 4050 acts as Buffer as-well-as a Converter. The input signals may vary from 2.5 to 5V digital TTL compatible or DC analogue but the IC always gives 5V constant signal output. The IC acts as buffer and provides isolation to the main circuit from varying input signals. The working voltage of IC is 4 to 16 Volts and propagation delay is 30 nanoseconds. It consumes 0.01 mill Watt power with noise immunity of 3.7 V and toggle speed of 3 Megahertz. We also use the ULN 2003 relay. Relays are basically electromagnetic devices which are activated by current or voltage in one circuit to activate or deactivated another circuit. This voltage or current in some circuits

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may sometimes not be able to directly drive the relays. Thereby high-voltage high-current Darlington arrays are designed to interface with such circuits. The series ULN2000A/L ICs can drive up to seven relays. Typical loads for relays include magnetic print hammers, solenoids, stepping motors, multiplexed LED and incandescent displays, and heaters. These Darlington arrays are furnished in 16-pin dual in-line

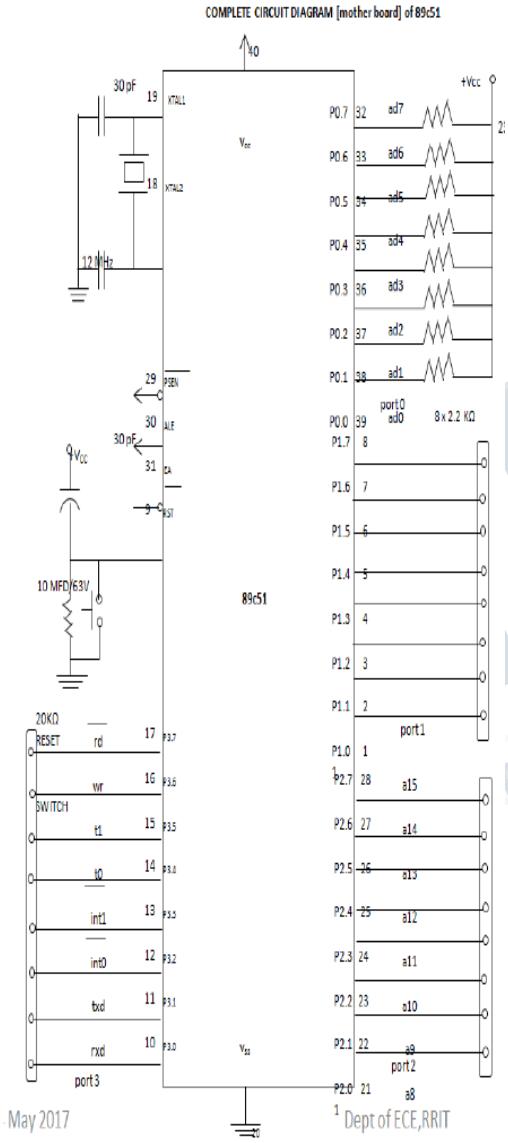

Fig 3.3: Circuit Diagram of 89c51 Microcontroller

IV. HARDWARE AND ITS RESULTS

The model consists of three sections: ATM card section, ATM machine section and Head office section.

4.1 ATM CARD SECTION

It consists of mainly DTMF encoder which gives the signal out to the copper plates which will be in contact with the human body. Circuit is powered by 9V battery. A switch is included to indicate that different cards can be made to generate different frequencies.

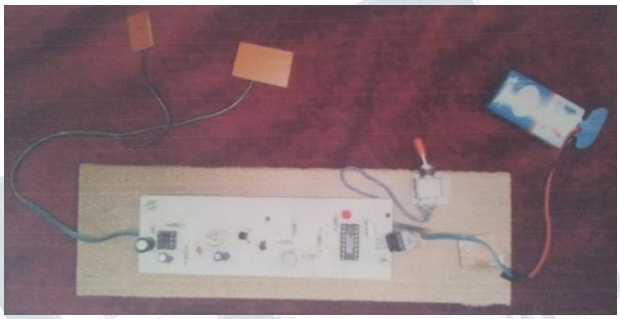

Fig 4.1: ATM card section

4.2 ATM MACHINE SECTION

It consists of decoder to decode the incoming signals, a microcontroller to interface with LCD display to display the various conditions. This paper proposes a two-level security. Another feature that has been implemented is GSM model that sends a message of Authorization to designated mobile number.

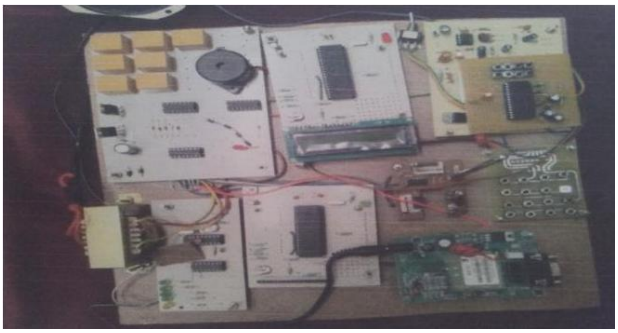

Fig 4.2: ATM machine section

V. SOFTWARE ALGORITHM

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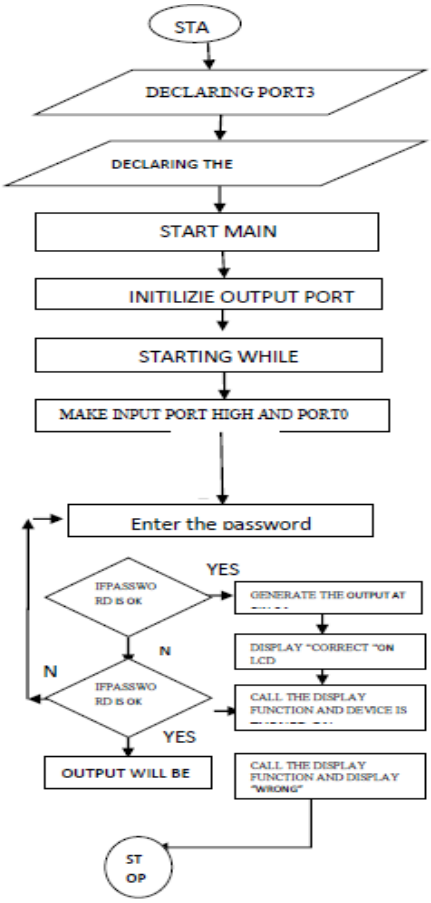
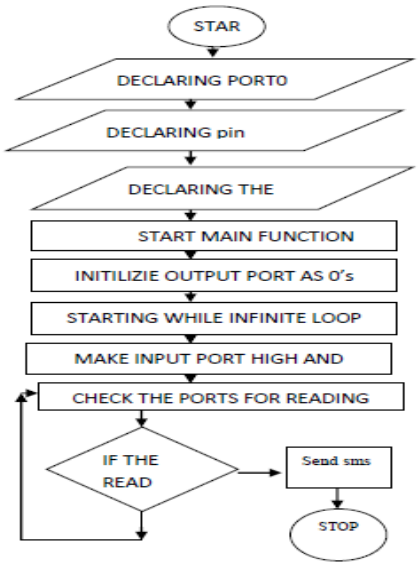
a) FLOW CHART FOR PASSWORD



b) FLOW CHART FOR GSM



VI. EXPERIMENTAL RESULTS:

Figure5.1. displays the transmission of data via the human body. An Encoder generates the valid/invalid signal for authorized/unauthorized entry respectively. Figure5.2. Shows the LCD display which asks for a PIN after authorized entry is detected. This procedure is used to provide an extra layer of security. Figure 5.3. The RF Paging Circuit Displaying the authorized entry at a distance which can be used at monitor stations adding another layer of security to our system. Figure5.4.The RF detecting unauthorized entry and setting o ff the alarms.

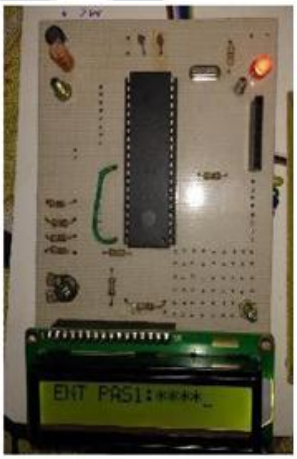


Fig. 5.1. Encoder and Decoder, Fig. 5.2 Password Entry touch plates

Fig. 5.3 Authorized User Detected
Fig.5.4Unauthorized

VII. RESULTS:

• In this proposed work successfully implemented ATM Security System and DOOR Opening and closing System.

• In this proposed work Redtacton Transmitter generating the DTMF signal and made to flow through the body. Whenever the body comes in contact with the Receiver section then the receiver part will accept the signals and verify whether the person is authorized or not. If the received signal is authorized then we Can enter the password through keypad, if the password is correct then voice recorder will be activated. Then voice recorder will playback the messages like savings, balance enquiry, Mini statement, withdrawal etc.

• Another application is an DOOR opening and closing system, it means that when the person is authorized then the door will be opened. For this application we have used motor, when the motor is activated it means door will be opened. For motor ON time indication purpose we have used 555 timer and finally got the results.

VIII. APPLICATIONS:

The applications of this technology are vast. A few among them being:

1. Automobile Applications
2. Conference Systems
3. Touch Advertising
4. Wireless Headset
5. This project can be used inMedical and Consumer applications.

IX. CONCLUSION:

The proposed system has been implemented successfully and is tested on hardware. Experimental results verify the effective developed operation. When we compare RedTacton with other technologies, it can give a better security since here is no problem of hackers as our body itself acts as transmission medium and can be used more in the fields where there is a need to upgrade the security in times of high theft rate.

X. ACKNOWLEDGMENT:

This paper and project would not have been a reality if Mr.Prem sagar H Assistant Professor, Dept. of Electronics and Communication, RRIT was not our mentor and guide. His guidance has been a major force in the completion of our working model. We would also like to thank Mrs.Parimala Gandhi G HOD, Department of electronics and Communication, RRIT. for giving us permission to carry out this project.

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