

Redtacton Based Pin Accessibility for ATM using Human Body Communication

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Abstract— This paper explains An Automatic Teller Machine (ATM) is a computerized machine that uses to withdraw the cash from customer's respective bank account. As financial user prefer ATM for cash withdrawals, cash deposits and many other transactions, the banks are focusing a lot over the security of ATMs. In this system, we use a modern method of human body communication using RED-TACTON. Here a body based communication is performed. Redtacton is a Human Area networking technology that uses human body as a safe high speed network transmission path. Redtacton uses minute electric field on the surface of the human body as a medium for transmitting the data. A transmission Path is formed at the moment a part of human body comes in contact with Redtacton transceiver. In addition, the element of one time secret key (OTP) based transaction, if the user is not present physically to access the ATM. Now the person trying to access the ATM can call and get the OTP details and access the atm. in order to enhance the security for atm cards, redtacton based smart security card is presented. thus, the proposed method is secure against all types of pin attacks such as card skimming, card cloning and hacking.

Key words: ATM, Buzzer, GSM, Keypad, Redtacton Transmitter, Redtacton Receiver, Power Supply

I. INTRODUCTION

Security has always been a major concern and goal of all organization. There is no such object which can be considered as completely secure especially if it is about money. Security is not only confined to network but also includes Physical Security. When talking about ATM machines or EDC we are mainly concerned with Physical security which aims at ensuring Access control, Identification and Authentication. Access control is another consideration of Information System security to confirm the identity of individual so that only authorized entity is accessible to the system. With the development of banking technology the way of banking has changed. An ATM card or debit card authenticates person after verification of card number, Expiry date, card holders name and the PIN. But what in case your card is stolen, or PIN is known to an unknown entity. For this we require a higher level of security. Frauds attacking the automated teller machine have increased over the decade which has motivated us to use the biometrics for personal identification to procure high level of security and accuracy. And also we use a modern method of communication using RED-TACTON. Here a body based communication is performed. We also implement the concept of OTP based transaction if the user is not present physically to access the ATM. Now the person trying to access the ATM can call and get the OTP details and access the ATM. 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.

II. BLOCK DIAGRAM OF THE SYSTEM

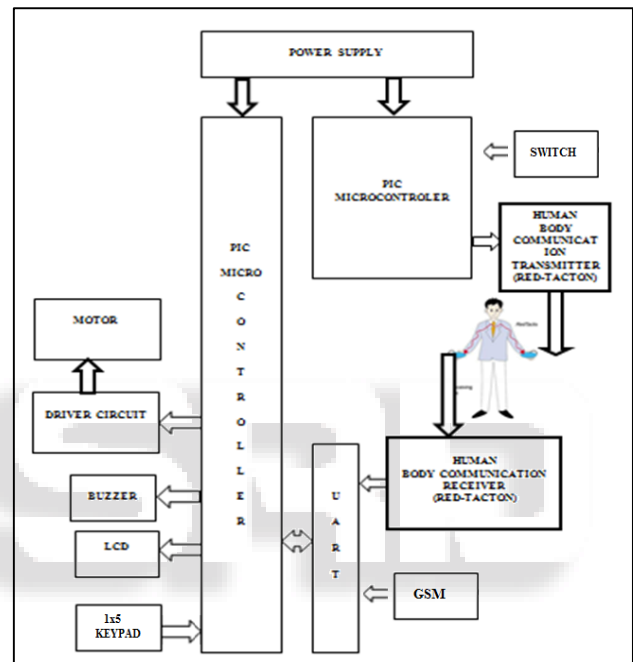


Fig. 1: Block Diagram

The block diagram of smart security card system is shown in Fig 1. It consists of RedTacton transmitter, RedTacton receiver, Driver, Microcontroller unit and keypad.

As the transmitted signal is of very low voltage, buffers and drivers are used to send the received signal to the electromagnetic switch. Electromagnetic switch checks the received signal with the predefined valid code. If an invalid code is received and detected in the switch then the buzzer starts ringing indicating that an invalid card is trying to access the ATM. If a valid code is received, then only the switch sends the signal to the main control unit which is the microcontroller. If microcontroller gets active it switches on the keyboard where predefined options are stored to perform various tasks such as: Enter password, Change of password, New password, etc.

- 1) A power supply unit (or PSU) converts mains AC to low-voltage regulated DC power for the internal components of a computer. Modern personal computers universally use switched-mode power supplies. Some power supplies have a manual switch for selecting input voltage, while others automatically adapt to the main voltage.

- 2) The potential transformer will step down the power supply voltage (0-230V) to (0-6V) level. Then the secondary of the potential transformer will be connected to the precision rectifier, which is constructed with the help of op-amp. The advantages of using precision rectifier are it will give peak voltage output as DC, rest of the circuits will give only RMS output.
- 3) Voltage regulators comprise a class of widely used ICs. Regulator IC units contain the circuitry for reference source, comparator amplifier, control device, and overload protection all in a single IC. IC units provide regulation of either a fixed positive voltage, a fixed negative voltage, or an adjustably set voltage.
- 4) When four diodes are connected as shown in figure, the circuit is called as bridge rectifier. The input to the circuit is applied to the diagonally opposite corners of the network, and the output is taken from the remaining two corners.
- 5) Microcontroller: All the functions required on a single chip. A microcontroller differs from a microprocessor, which is a general-purpose chip that is used to create a multi-function computer or device and requires multiple chips to handle various tasks. A microcontroller is meant to be more self-contained and independent, and functions as a tiny, dedicated computer. They are typically designed using CMOS (complementary metal oxide semiconductor).

III. PIN DIAGRAM AND ITS EXPLANATION

The term PIC, or Peripheral Interface Controller, is the name given by Microchip Technologies to its single – chip microcontrollers. PIC micros have grown to become the most widely used microcontrollers in the 8- bit microcontroller segment.

The PIC16F877A CMOS FLASH-based 8-bit microcontroller is upward compatible with the PIC16C5x, PIC12Cxxx and PIC16C7x devices. It features 200 ns instruction execution, 256 bytes of EEPROM data memory, self-programming, an ICD, 2 Comparators, 8 channels of 10-bit Analog-to-Digital (A/D) converter, 2 capture/compare/PWM functions, a synchronous serial port that can be configured as either 3-wire SPI or 2-wire I2C bus, a USART, and a Parallel Slave Port.

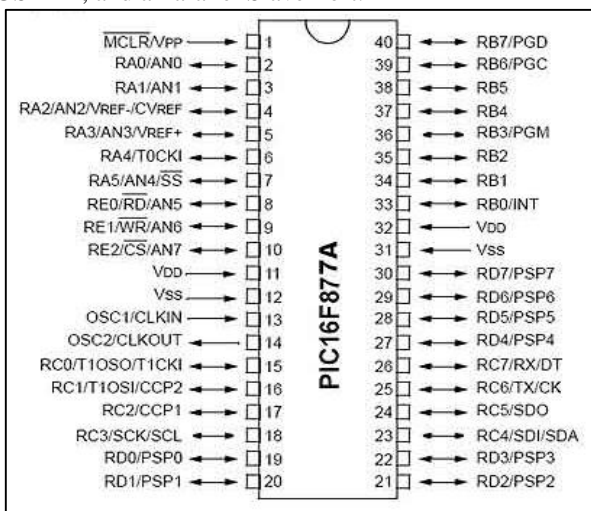


Fig. 2: Pin diagram of PIC16f877A

A. GSM modem

A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves. The working of GSM modem is based on commands, the commands always start with AT (which means ATtention) and finish with a <CR> character. For example, the dialing command is ATD<number>; ATD3314629080; here the dialing command ends with semicolon.

B. DC motor

A DC motor is designed to run on DC electric power. Two examples of pure DC designs are Michael Faraday's homopolar motor (which is uncommon), and the ball bearing motor, which is (so far) a novelty. By far the most common DC motor types are the brushed and brushless types, which use internal and external commutation respectively to create an oscillating AC current from the DC source.

C. Redtacton

RedTacton Technology was introduced by Nippon Telegraph and Telephone Corporation (NTT). TACTON- meaning "action triggered by touching" and RED. It is an auspicious color according to Japanese culture for warmth. It is a technology that uses the surface of the human body as a safe, high speed network transmission.



Fig. 3: Redtacton Transceiver

IV. REDTACTON TRANSCIVER

The Redtacton transmitter induces a weak electric field on the surface of the body and the receiver senses changes in the weak electric field on the surface of the body caused by the transmitter. It uses the minute electric field emitted on the surface of the human body. It is completely distinct from wireless and infrared. A transmission path is formed at a part of the human body which comes in contact with a Redtacton transceiver. Physically separating ends the contact and thus ends communication. Using Redtacton, communication starts when terminals carried by the user are linked in several combinations according to the user's natural, physical movements. Communication is possible using anybody surfaces, such as the hands, fingers, feet, face, legs, skin or torso. it works through shoes and clothing as well.

A. Features

- Communication by touch: Actions like touching, stepping etc ...are used for operations like START and STOP of the equipment, locking and unlocking etc.
- Any Media: Other than the human body, conductors or dielectrics or both in combinations can be used as transmission media. For eg water and other liquids, various metals, certain plastics, glass, etc.
- Broadband Feature: Bandwidth does not degrade even with duplex operations.
- Transmission Speed: Increase in the number of users does not affect the transmission speed.

B. Applications of Redtacton

If you want to listen to music from your MP3 player, you will have to adjust the headphone to your ears and then switch on the player that is kept in your pocket. But, with this technology, since there are no wires, the digital signals can be passed from your player to the headphone through your body, clothes, and shoes and so on. To play the next song or to adjust the settings you can do it by selecting one of the touching features as explained above. If you want to send the photos that are stored in your camera to a laptop, all you have to do is make a contact between the laptop and the camera. Other amazing applications also includes the sending of business cards to each other just by a shake hand, exchange telephone numbers while you are dancing, sending e-mails with a touch and so on.

C. Advantages of Redtacton

High Speed Communication is possible between any two points of the body. Body-based networking is more secure than other broadcast systems, such as Bluetooth which have high range of about 10m. When compared to other technologies, Network congestion due to fall in transmission speed in multiuser environments does not occur.

V. SOFTWARE REQUIREMENTS

A. Embedded C

High-level language programming has long been in use for embedded-systems development.. DSPs are often programmed in assembly language by programmers who know the processor architecture inside out. The key motivation for this practice is performance, despite the disadvantages of assembly programming when compared to high-level language programming.

B. MPLAB IDE

MPLAB Integrated Development Environment (IDE) is a free, integrated toolset for the development of embedded applications employing Microchips PIC and dsPIC microcontrollers. MPLAB IDE runs as a 32-bit application on Microsoft Windows, is easy to use and includes a host of free software components for fast application development and super-charged debugging.

C. Proteus Design Suite

The Proteus Design Suite is a complete software solution for circuit simulation and PCB design. It comprises several modules for schematic capture, firmware IDE and PCB

layout that appear as tabs inside a single, integrated application. This provides a smooth AGILE workflow for the design engineer and helps products get to market faster. The Proteus PCB Design products include both schematic capture and PCB layout modules and are designed to be both easy to use and powerful. Features such as a world class shaped based auto-router, 3D Visualization, automatic net tuning, design snippets and assembly variants save you time during product design. Meanwhile, a powerful design rule system enforces whatever rules and clearances you might need for your PCB. The routing of tracks is fully design rule aware and live clearance checking makes it easy to locate and correct any violations.

The Proteus simulation products all use the schematic capture module as the electronic circuit and our customized mixed-mode SPICE engine to run the simulation. Proteus VSM then allows the the microcontroller to also be simulated on the schematic while Proteus IoT Builder enables the design and test of the remote user interface for the circuit.

For embedded engineers, Proteus VSM bridges the gap in the design life cycle between schematic capture and PCB layout. It enables you to write and apply your firmware to a microcontroller component on the schematic (PIC, AVR, ARM, 8051, etc.) and then co-simulate the program within a mixed-mode SPICE circuit simulation.

For academics and the maker market, Proteus Visual Designer allows Arduino programs to be placed on the schematic with a mouse click. The entire Arduino system can then be simulated, tested and debugged in software. Proteus IoT builder then adds the ability to create a user interface for your phone or tablet to interact with the Arduino electronics. You can even test this by controlling the running simulation from your mobile device.

The Proteus Design Suite is a Windows application for schematic capture, simulation, and PCB (Printed Circuit Board) layout design. It can be purchased in many configurations, depending on the size of designs being produced and the requirements for microcontroller simulation. All PCB Design products include an auto router and basic mixed mode SPICE simulation capabilities.

D. SCHEMATIC CAPTURE

Schematic capture in the Proteus Design Suite is used for both the simulation of designs and as the design phase of a PCB layout project. It is therefore a core component and is included with all product configurations.

E. Microcontroller Simulation

The micro-controller simulation in Proteus works by applying either a hex file or a debug file to the microcontroller part on the schematic. It is then co-simulated along with any analog and digital electronics connected to it. This enables its use in a broad spectrum of project prototyping in areas such as motor control,[2][3] temperature control [4][5] and user interface design.[6] It also finds use in the general hobbyist community[7][8] and, since no hardware is required, is convenient to use as a training[9][10] or teaching tool.[11][12] Support is available for co-simulation of:

- Microchip Technologies PIC10, PIC12, PIC16, PIC18, PIC24, dsPIC33 Microcontrollers.

- Atmel AVR (and Arduino), 8051 and ARM Cortex-M3 Microcontrollers
- NXP 8051, ARM7, ARM Cortex-M0 and ARM Cortex-M3 Microcontrollers.
- Texas Instruments MSP430, PICCOLO DSP and ARM Cortex-M3 Microcontrollers.
- Parallax Basic Stamp, Freescale HC11, 8086 Microcontrollers.

VI. VERIFICATION & RESULTS

A. Simulation Results

Schematic capture in the Proteus Design Suite is used for both the simulation of designs and as the design phase of a PCB layout project. It is therefore a core component and is included with all product configurations.

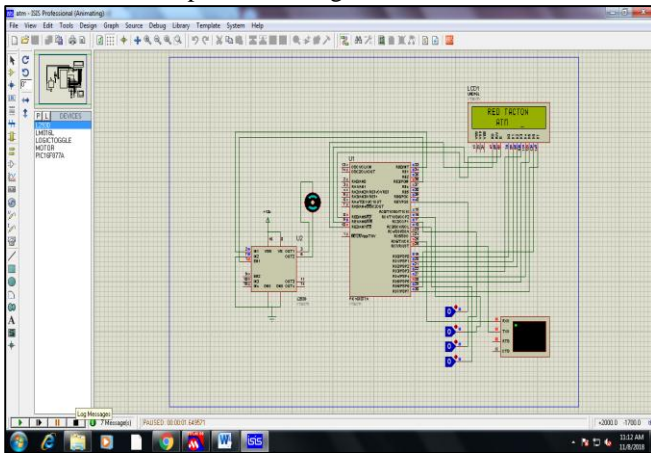


Fig 4. Output for Proposed System

B. Compilation Results

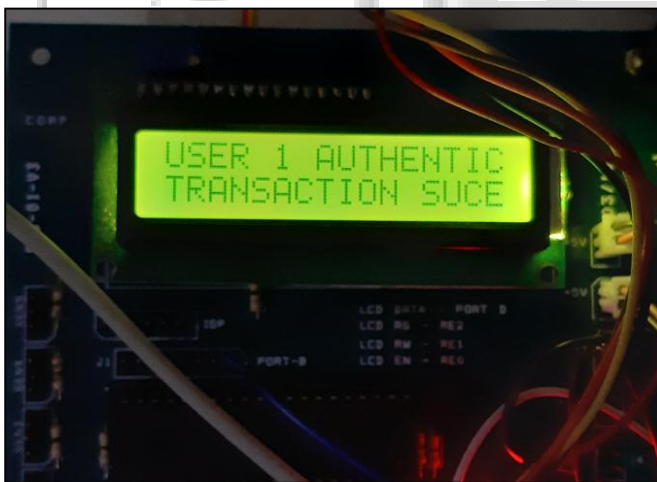


Fig. 5: Hardware kit for proposed System



Fig. 6: LCD Display 'correct'

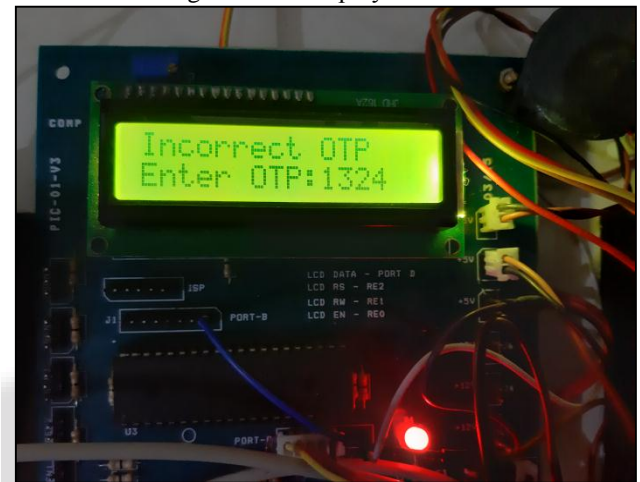


Fig. 7: LCD Display 'Incorrect'

VII. CONCLUSION

ATM (Automatic Teller Machine) has proved to be an easy and convenient way to carry out all our banking tasks in just few minutes. An ATM card or debit card authenticates person after verification of card number, Expiry date, card holders name and the PIN. But what in case your card is stolen, or PIN is known to an unknown entity. For this we require a higher level of security. In this system, we automate a secured ATM transition system. Security is provided by using human body communication. This increases the security as well as increases the feasibility for the user to make an ATM transaction.

REFERENCES

- [1] Bhoraskar.R, Kulkarni.P, Raman.B, and Vankadhara.N (2012), "Wolverine:Traffic and road condition estimation using smartphone sensors," in 4th International Conference on Communication Systems and Networks, pp. 1-6.
- [2] D'Hondt.E, Stevens.M, and Jacobs.A (2013), "Participatory noise mapping works! an alternative to standard techniques for environmental monitoring," Pervasive Mob. Computing. vol.9, no. 5, pp. 681-694.
- [3] Estrin.D (2010),"Participatory sensing: Applications and architecture," IEEE International conf.,vol.14, no. 1, pp. 12-42.

- [4] Guo et al.B (2015) “Mobile crowd sensing and computing: The review of an Emerging human-powered sensing paradigm,” *proc.international conf on network on chips.*, vol.48, no. 1. pp: 593 – 598.
- [5] Hu.S,Su.L, Lu.H,Wang.H, and Abdelzaher.T.F (2015) “SmartRoad,” *ACM Trans. Sens. Networks IEEE journals*, vol. 11, no. 4, pp. 1–27.

