RedTacton Han Based ATM Control System

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Abstract: This paper proposes a smart card for ATM systems using RedTacton technology. It is a Human Area Networking technology that uses human body as a safe high-speed network transmission path. The technology uses minute electric field induced on the surface of the human body as a medium for transmitting the data. A transmission path is formed the moment a part of human body comes in contact with RedTacton transceiver. The transmitter section consists of a DTMF encoder which generates both valid and invalid signals and can be transmitted through human body. The RedTacton receiver which consists DTMF decoder carry out the further process. For the transaction to begin a OTP which is sent to the user's cellphone has to be entered and this adds to the double security.

Keywords: Human Area Networking (HAN), RedTacton.

1. Introduction

In Human Area Network (HAN) technology body parts such as hands, arm, fingers, legs, and toes are used for data transmission path. Data transmission rate is nearly equal to 10 mbps and also it is a safe medium. And this technology is completely different from infrared and wireless, because it uses the minute electric field on the surface of human body. Red is auspicious color for warmth inJapanese culture and action takes by triggering and hence the name REDTACTON. As NTT says human body can act as a perfect conductor to send electric data, REDTACTON uses a conversion method. In this, digital data takes as a low power digital pulse and easily transmits through human body. REDTACTON is based on principle that the properties of an electro-optic crystal can change as per change in weak electric field. NTT developed a sensor called as 'Photonic electric field sensor' for the detection of minute electric field on surface of body. The three main features of this technology are i) Touch ii) Broadband Interactive iii) Any-Media. Touch: The communication starts with touching. Human movements such as touching, gripping, walking can be triggers for locking and unlocking or starting and stopping purpose devices or to get data. Broadband and Interactive: The communication is duplex and as well as interactive. Chances of data loss is very less as the speed is very high and is up to 10 mbps.

Simultaneously many people can communicate with each other. Any Media: In addition to human body we can also use other dielectrics and conductors as transmission media. It works through shoes and clothing also, but within distance of 10 cm. The focus on ubiquitous service has resulted in shortening of distances in communication. RedTacton is positioned as the last 1m solution for the ultimate close range communication.

However, from another aspect the interception of arriving signals causes security issues. In wired communication data transmission is between two connection points, so interception is difficult and it is highly secured. But the self-containment of Smart Card makes them resistant to attack as they don't need to rely upon potentially vulnerable external resources. Because of all of this Smart Cards are often used in applications requiring strong security protection and authentication. As we know technology and security are strongly related. Hackers find sophisticated ways to get at supposedly secure data on cards. Manufacturers have to come up with more sophisticated locks and keys for the cards. Then also hackers come up with better techniques to bypass these. Thus forming an infinite improvement loop with both the sides driving each other to use and invent better technology. [1] RedTacton is able to achieve duplex communication over the human body at a maximum speed of 10 mbps. The RedTacton transmitter induces weak electric field on the surface of the body. The RedTacton receiver senses the change 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 in the weak electric field. The changes in the optical properties can be detected by an electro-optic crystal using a laser and converts the result into an electrical signal in an optical receiver circuit. The transmitter sends data by causing fluctuations in the weak electric field on the surface of the human body. The data reception is done using a photonic electric field sensor. This sensor is a combination of an electro-optic crystal and a laser light to detect fluctuations in the minute electric field. [2] With the help of a RedTacton electro-optic sensor, duplex communication is achieved between any two points on the body at a throughput of up to 10 Mbps. The communication is not just only applicable to the surface of the body; it can also travel through the user's clothing to a RedTacton device in the pocket or through shoes to communicate with a RedTacton device embedded on the floor.

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853

Like wireless technologies, the transmission speed does not deteriorate even in the presence of large crowd of people and even if all of them are communicating at the same time in meeting rooms, auditoriums or stores. Only because the body surface is the transmission path, increasing the number of connected users which in turn increases the available number of individual channels. A wide range of materials can be used as transmission medium, with the condition that the material is conductive and dielectric which includes water and other liquids, various metals, certain plastics, glass, etc. We can also use ordinary structures such as tables and walls that are known and readily available. One can easily construct a seamless communication environment at a very low cost using RedTacton.

2. Existing System

In the recent years, which were widely used ATM security system are.

A. Face detection based ATM security system

In this system we are using embedded Linux, which uses face detection technique for reliable and less human interaction. The system can be implemented on the credit card size Raspberry Pi board with extended capability of open source Computer Vision.

B. IRIS recognition based authentication system in ATM

IRIS recognition based authentication system in ATM which uses IRIS recognition type of biometric system that can be used to reliably identify a person uniquely by analyzing the patterns found in his iris.

C. Finger print based ATM system

Finger print based ATM system which uses biometric technology because the fingerprint do not change for the whole life and it is easy to use. Fingerprints are used to identify if the Person is genuine.

3. Proposed System

RED-TACTON consists following three major parts namely
   1) HAN transmitter
   2) HAN receiver
   3) HAN

The HAN TRANSMITTER consists of transmitter circuit, which induces weak electric field on the human body surface and data sensing circuit which differentiate between transmitting and receiving mode by detection of transmission and reception data. HAN TRANSMITTER acts as encoder in this case.

The HAN RECEIVER works as decoder; it senses changes in electric field on the surface of the human body which is caused by HAN TRANSMITTER.

Authentication password is burned both in transmitter and receiver side. When authentication process starts, password flows from transmitter towards receiver, if both password

matches, authentication will be successfully done.

After authenticating the microcontroller present in ARM LPC2148 helps the user to enter the security pin which is sent to registered mobile number through GSM, which can be entered through the keypad interfaced in the hardware.

If it is successful entered, then he can continue his transaction and complete his transaction successfully. Here LED used for indication of authentication. When person will get authenticated LED will be glow.

4. Objectives and Methodology

A. Objective 1: To ensure safe working of various modules

1. This section consists of a power supply unit and an interfacing stage consisting of buffer, driver and relay.
2. The primary function of a power supply is to convert electric current from the source to the specific and stabilized voltage to the power load.
3. In the present circuit KIA 7812 three terminal voltage regulator IC is used to get +12V and KIA 7805 voltage regulator IC is used to get +5V regulated D.C. output.
4. In this section driver is used to drive the relay where the output is compliment of input which is applied to the driver.
5. The IC4050 acts as buffer and provides isolation to the main circuit from varying input signals.

B. Objective 2: To enable Red-Tacton based smart card

1. We are designing a card that acts as the entire transmitter.
2. It consists of a DTMF UM 95089 encoder, 9V Battery, 5VRegulator, and other basic components embedded together in a very compact size.
3. DTMF generator is the one which is specifically designed to implement a dual tone system, in applications which require fixed supply operation and high stability tone output level, making it well suited for electronic applications.
4. The transmitted information is given to the copper touch plates and is received by the receiving section at the other end of the copper touch plates.
5. The DTMF decoder is used to identify the transmitted signal. The Red-Tacton receiver consists of electro-optic sensor, leaser light and detector circuit which consists of UM8870 IC.
6. It decodes the received signal which is having 2 frequencies i.e. row frequency and column frequency.
7. After this it will check the lookup table with respect to row and column frequency to generate the digital output.

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854

Fig. 1. Encoder and decoder ICs

C. Objective 3: To ensure easy transaction

1. The tasks related instructions are loaded into ARM which is programmed using embedded C language.
2. After reading the card information this ARM processor will generate one-time password only for the authorized person.
3. If valid code is generated, then only the switch sends the control to ARM7 LPC2148 and OTP is sent to the registered mobile number and then the person has to enter the received OTP.
4. If an invalid code is received and detected, then the buzzer starts ringing indicating that an invalid card is trying to access the ATM.

Fig. 2. LPC2148

D. Objective 4: Acknowledgement of the transaction

1. When the microcontroller gets active, it sends OTP to the concerned person and switches on the keypad where he/she can enter OTP which they received to their mobile.
2. After entering the valid OTP the voice bank gets activated.
3. In the voice bank, predefined options with keys are present which guides the user to select appropriate action in the ATM such as cash withdrawal, pin change, account balance, etc.

5. Applications

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

A. One to One Services

Enables one-to-one services tailored to user's situation and tastes. The attributes of information recorded in the Red-Tacton device is sent to the touched objects. The appropriate services are provided based on the attribute information received by the Red-Tacton receiver.

B. Elimination of human error

Red-Tacton device embedded medicine bottles transmit information on the medicines attributes. If the user touches the wrong medicines, an alarm will trigger on the terminal he is carrying.Avoidance of risk at construction sites.

C. Intuitive Operations

Natural movements and the action are trigger (touch). The Red-Tacton transceiver is embedded in two terminals which can communicate not only the data but also the control or configure the instructions needed to operate the devices.

Fig. 3. Intuitive operations

D. Personalization of Mobile Phones

Your own phone number is allocated and billing commences. Automatic importing of personal address book and the call history. The PC is configured to user's specifications simply by touching the mouse.

Fig. 4. Personalization of mobile phones

Advantages

1. Less power consumption.
2. Traffic and Network congestion does not occur.
3. Data loss during transmission is less.
4. Transmission speed does not deteriorate, even though the number of users increase.
5. Body –based networking is more secure than broadcast systems such as Bluetooth, which have high range of about 10m.
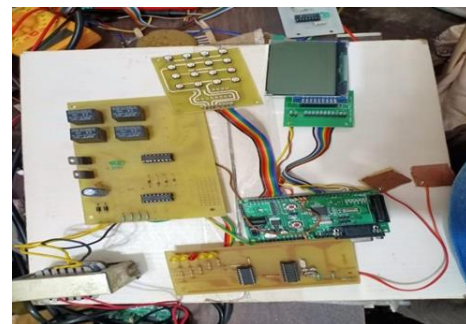
6. Result

Fig. 5. RedTacton HAN based ATM control system

In this proposed work, we successfully implement ATM Security System. In this proposed work RedTacton Transmitter

generating the DTMF signal is made to flow through the body. Whenever the body come in contact with the Receiver section then receiver part will accept the signals and verify whether the person is authorized or not. If the received signal is authorized then the OTP is generated and SMS is sent to the registered mobile number through the GSM module, then the OTP acts as password and we can enter the password through keypad, if the password is correct then the transaction starts like savings, balance enquiry, mini- statement, withdrawal etc.

If password is incorrect the buzzer activates and the process terminates.

7. Conclusion

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

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