

Multipurpose Card Using Rfid Technology

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Abstract- Most often in our daily life we have to carry lot of cards such as credit cards, debit cards and some other special cards for toll system ERP, parking and personal identification purpose. Currently smart card implementations can be seen around the world but they are not unified i.e. each developers uses different programming standards and data structures. The smart card will provide service to the user only within a university campus or an organization. In order to make available such multiple application access using a single card to every individual person we have planned to use RFID technology, which is cost effective. As RFID technology is used in the proposed concept, the programming standards and data structures will be unified. Unlike smart card, the RFID card can be used by every individual person to access different applications. Thus, a person needs not to carry number of cards; he can just carry a single card for different purpose.

Keywords- Smart card; not unified; Multiple application access; Single card; RFID technology; Cost effective

I. Introduction

Smart card is mostly used in time and Attendance Management System in various organization and educational institutes. The details such as employee's arrival and departure time are recorded by the system besides maintaining information regarding their official and personal profiles. This system can also be used in voting. Eligible voters can be registered with the issuance of smart card. The main drawback is only the persons who belong to the organization or educational institute which provide the smart card can make use of it.

In this paper we have proposed a concept of accessing many applications through a single card by using RFID technology that can be used by every person. RFID card can be used for different purposes for example Voting cards and Aadhar cards (in INDIA). In addition to it, it can be used as a credit cards and debit cards. Even if a person has many accounts in different banks, it can be accessed by using a single RFID tag.

As the RFID tag carries detail about an individual, it is important to provide high security. RFID tag is tamper-resistant and information stored on the card can be accessed only by using a PIN code. If the card is lost, the user must inform to card administrator so that the administrator will lock the information about the particular user's card. So that other persons cannot make use of the card. In addition to it bio-metric application are used to have a highly secured access.

II. RFID Card Management and Access Control

RFID (Radio Frequency IDentification) is one of the ADC (Automated Data Collection) technology that transfer data between a reader and a movable item using radio-frequency waves to identify categorize, track. It is fast and does not require physical contact between reader/scanner and the tagged item.

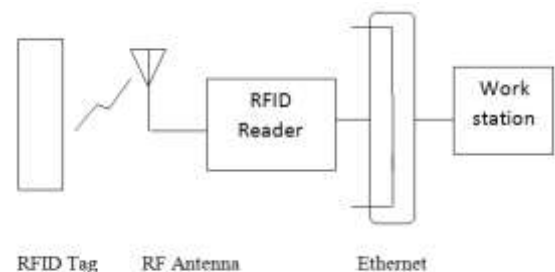


Fig 1: Components of RFID system

A. RFID Tag

RFID tag is made up of microchip attached to an antenna. The tag picks up signals from and sends signal to a reader. Each tag is assigned with a unique serial number. It is used to access applications and track things. It can also be used to access different bank accounts. Depending on the application tags have lots of different form factors. RFID tags can be active or passive. Active RFID tag has their source and transmitter. Passive RFID tag has no internal source.

As passive RFID system use tags with no internal power source, without a battery the tag can last a life time. Passive RFID system is economical for many industries

because of its lower price point per tag. Passive RFID tags depend entirely on the reader as their power source. These tags are read up to 20 feet away. Based on storage there are three types of tags. They are

- Read–write.
- Read-only.
- WORM (Write once, read many).

A **Read – Write** tags data can be added to or over written. **Read- only** tags cannot be added to or over written. They contain only the data that is stored in them when they were made. **WORM** tags cannot be over written. But adding additional data once is possible. RFID Clamshell card is used in this concept which contains EM4001 ISO based RFID IC.

B. RFID Reader

An RFID reader is a network connected device either fixed or mobile. It contains an antenna that sends power as well as data and commands to the tags. For RFID tagged items the reader acts like an access point so that the tag's data can be made available to business application. Electrical current is converted into electromagnetic waves by the reader's antenna. The electromagnetic waves are then radiated into space which is then received by a tag antenna and converted back to electrical current. Once the tag is energized it transmits the information contained in it to the reader. The reader used in the concept reads EM4100 transponder tags. The reading distance lies in the range of 10-15cm.

III. Design Of Multipurpose Card Using RFID Technology

There are three main components in a Radio Frequency Identification Technology. They are

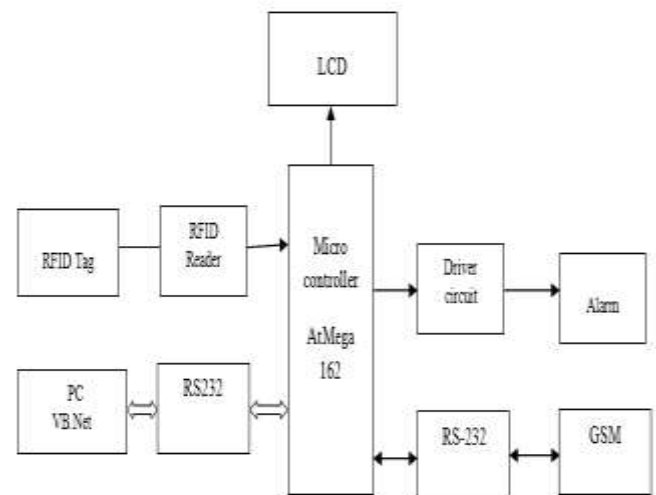
1. A scanning antenna.
2. A transceiver
3. A transponder also called as the RFID tag that has been programmed with information.

Radio-frequency signals are emitted by the scanning antenna in a relatively short range. The RF radiation provides a means of communication between the transponder (the RFID tag) and the reader. In the case of Passive RFID tags, it also provides the tag with the energy to communicate.

The key part of the technology is that RFID tags do not need to contain batteries, and therefore it can be used for very long periods of time (maybe decades).The scanning antennas can be permanently fixed to a surface; handheld

antennas are also available. They can be designed in whatever shape we need; for example, in order to accept data from persons or objects passing through a door, the antennas can be built into a door frame. The reader (transceiver) mostly used is a fix mounted system, where as the transponder is the moving part. The reader and the transponder work as a wireless, magnetic coupled communication system. Both the reader and the transponder contain resonance circuit tuned to the frequency as close as possible. The energy to the transponder is provided by the reader through an electromagnetic field. By modulation this field, the reader can transmit (write) data to the transponder. The transponder will power up and return the data stored in its chip to the reader.

AtMega 162V is used as the data processing unit because it is a low-power CMOS 8-bit microcontroller. It is based on the AVR enhanced RISC architecture. It executes powerful instructions in a single clock cycle and so that a



Block diagram of Card accessing setup

throughput approaching 1MIPS per MHz is achieved. This high throughput allows the system designer to optimize power consumption versus processing speed. The operating voltage of AtMega 162V is 1.8 to 5.5 V.

The speed grade ranges from 0 to 8 MHz. It has five ports namely PORT A, PORT B, PORT C, PORT D and PORT E. PORT A to PORT D has 8-bit bi-directional I/O port. PORT E has 3-bit bi-directional I/O port. The supply voltage is given to the 40th pin of the controller. The output from the reader is connected to the controller's 10th pin which is an I/O pin of PORT D. The controller is connected to the PC by means of RS-232 cable.

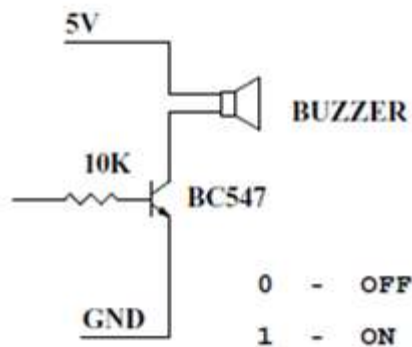
In this circuit the microcontroller's transmitter pin is connected to the MAX-232 T2IN pin. It converts 5V

TTL/CMOS level to RS-232 level. Then the receiver pin of 9 pin D type serial connector which has a direct connection to the PC is connected with the T2OUT pin. In PC the transmitting pin of 9 pin D type connector is used to give the transmitting data to R2IN of MAX-232 which converts the RS-232 level to 5V TTL/CMOS level. The receiver pin of the microcontroller is connected with the R2OUT pin. Likewise the data transmission and reception takes place between the microcontroller and PC or other device vice versa.

The tag transmits the 32-bit unique ID of a user to the controller through the reader, which is then transmitted to PC. The information about the user which is present in the tag and the database will be cross verified.

If the information matches, the list of applications that can be accessed using the RFID tag will be displayed on the PC monitor. From the list of applications, the required application can be accessed by giving the unique user password. If the password is correct the system will allow us to proceed further, otherwise it will not allow to access the application.

An alarm is connected to the microcontroller which is used to produce a beep sound. If a low signal comes from the microcontroller alarm will be in OFF state and if a high signal comes from the microcontroller, it will be turned ON. The transistor used in the circuit is BC547, which acts as a switch.



A user's different bank accounts can be linked using a MATLAB code. The coding is booted into the controller by means of using MPLAB 8.X. Once the tag transfers the 32-bit unique ID of user, the information about the user along with the bank accounts can be accessed.

If the card is lost the user can intimate about that to the RFID card administrator using GSM technology. The card administrator will block the information about the particular user's card, so that others cannot access the application. The user can further make an approach to the RFID card administrator in order to get a new multipurpose card for accessing different application. In addition to it finger print

technology can also be added in order to provide high security.

IV. RESULT AND CONCLUSION

Thus a single card can be used to access different applications. Even if the user has more than one bank account, he need not to carry multiple credit and debit cards instead of that he can use a single card. As passive RFID tags are used, there is no need to change a battery. So the tags can be used for lifetime and it is also cost effective.

V. REFERENCES

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