Intelligent Access Control System Based on RFID
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Abstract. An intelligent access control system based on radio frequency identification (RFID) has
designed in this paper, which is composed of access control unit and ID card unit. The access
control system is an intelligent access control system which can quickly confirm the true identity of
the personnel through RFID authentication. When the user enters the detection range of the access
control system, the system will automatically obtain identity information to identify the user’s
legitimate and to record the staff information, the alarm signal is sent out for the illegal intruder, so
to solve the safety problem of residential areas and to improve the quality of people's lives.

Introduction
Radio frequency identification technology[1-2] is a kind of automatic identification technology in
1990s, as a high-tech fast, real-time and accurate information acquisition and processing of
information, which was listed as the ten important technologies in twenty-first Century in the world,
there is a wide application prospect for production, sales and logistics and other fields. The access
control system shows its strong development space with the continuous development of society
gradually development, progress and intelligent, with the rapid development in many fields of
computer technology and network system, the intelligent IC card contact and password access
control system gradually get people's attention with continuous development of mature electronic
lock. With the application of contact intelligent IC Carmen prohibition system, its market scale is
constantly expanding. Its own insurmountable shortcomings become the obstacle of the
development of intelligent IC prohibition system. Therefore, the ID card has been inspired by the
market. An intelligent access control system has provided in this paper for radio frequency
identification (RFID). It is an intelligent access system which can quickly confirm the true identity
of the personnel through RFID authentication. When the user enters the detection range of the
access control system, the system will automatically obtain identity information to identify the
user’s legitimate and to record the staff information on the illegal intruder alarm signal, so to solve
the safety problem of residential areas to improve the quality of people's lives[3-8].

Design of the Access Control System
The access control system includes the access control unit and the ID card unit. The access control
unit is composed of LF transmitter module, RF receiver module, alarm module, standby power
supply module, intelligent electronic lock module, Wireless communication module and access
control module. Access control module is supplied by the standby power supply module, LF
transmitting module and RF receiving module are connected with the access control module by
two-way communication. The access control module receives RF data signal of ID by RF receiver
module, ID card unit receives LF data signal of the access control unit by LF receiver module, the
RFID module chip of ID unit is added in the allowed access to personnel identity information, the
access control are connected with ID card by two-way communication connection. The main chip
of access control module uses the STC89C52 chip, there are the wireless communication module
for data transmission between outside (PC) and access control module, LF transmit and LF receive
module is completed through electromagnetic coupling, RF transmit and RF receive module is
completed by using ASK modulation, wireless communication module is completed by using
RS-485 protocol. The principle diagram of the access control unit is shown in Figure 1, and the principle diagram of the intelligent control system is shown in Figure 2.

Figure 1. The principle diagram of the access control unit.

![Diagram of Access Control Unit]

Figure 2. The principle diagram of the intelligent control system.

![Diagram of Intelligent Control System]

Figure 3. The hardware circuit of the system.

The hardware circuit of the system is shown in the Figure 3, that is the circuit diagram of IC card and its read-writer hardware. The reader is composed of single chip GMS97C52, keyboard, display, monitoring circuit. IC card uses XICOR company’s X76F100Y, X76F100 is 128x8 bit secret serial FLASH E2PROM, its read password and write password are 64 bit respectively. The chip is packaged in a card, and the card inserts into the card of IC card reader, the reader can read and write on it, which achieves encryption, query, deposits, withdrawals and other functions. IC card has 8 pins, when the X76F100Y is inserted into the IC card the connected with pins. There are two fixed ends, one of fixed ends is connected with a spring of the seat, two contacts and springs is equivalent to a normally closed switch. When the card is not inserted, the spring is closed and the P3.2 foot keeps low, when the card is inserted, the spring is pushed open and the P3.2 foot becomes high. When the single chip detects that the P3.2 foot is higher, the RST pin of X76F100 is increased by P1.3 to reset it.

The single chip microcomputer uses the GMS97C52 of LG company. It has 8K byte ROM, 256 byte RAM and 32 I/O ports, P1 port is connected with serial device X25045 and X76F100, P0 and P2 port are used for keyboard and display, P3.2 in P3 port is used to detect IC card insertion, and the remaining 7 ports can be expanded by other functions.

The X25045 chip is used for the monitoring circuit, which includes watchdog timer, voltage monitoring circuit and E2PROM memory. When the power is dropped, the RESET signal is generated on the GMS97C52, and the watchdog monitors the system to prevent the death of the machine.
The keyboard interface circuit is implemented by I/O port, and there is 4 x 4 structure and 16 keys. The number key is 11, the function key is 4, the return key is 1.

The display part is based on LED display and is also implemented in I/O port. It is used to display the state of the system, the input password, the amount to be accessed, and the error information.

Conclusion

The radio frequency identification intelligent access control system has been designed in this paper, which can quickly confirm the true identity of the personnel through RFID authentication. When the user enters the detection range of the access control system, the system will automatically obtain identity information to identify the user’s legitimate to record the staff information, the alarm signal is sent out for the illegal intruder, so to solve the safety problem of residential areas and to improve the quality of people’s lives.

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References


