



RFID Based Access Control System

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ABSTRACT: Radio Frequency Identification (RFID) based access control system is described in this paper. RFID cards are used for entry and exit of the employees in many organizations. Previously punch card system was very commonly used to get the time of entry and exit of employees. But it is manual system and it can be tempered. But with the use of RFID based technology there is no direct intervention of human being and the date and time of entry and exit is more accurate and the data can be easily collected via computer. The RFID system is designed using HID OEM 50 card reader and micro-controller. The user data from RFID card is accessed by micro-controller through card reader, after authentication, date & time stamping is done. The formatted data is transmitted to main server through GSM modem. After successful authentication, control signals are generated to stepper motor for opening of the gate. The RFID system is implemented using custom designed board with size of 10 cm x 5 cm and weight is 200 grams. The board consumes around 1 watt power.

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1. Introduction

This paper describes RFID based access control system for authorized entry and exit in the restricted premises. This is the most efficient and cost effective solution. With the use of RFID reader at various gates within the organization even we can restrict the entry of the employees or visitors in limited area. This technology is easy to adopt and implement and provides safety as compared to that of previous methods. The system operates on RFID technology. HID i-class OEM 50 reader module is used. In this system each employ has given RFID tag which contains unique identification number stored in its RAM. In the database of the system RFID tag numbers are stored for verification and validation. The RFID readers are placed at the entry and exit gates as well as at the entry of the restricted area within the organization. These readers are connected with GSM modems. So that upon the request for server the reader can provide the information about the entry and exit of the employees. Work in three different ways as per user's requirement.

2. Architecture Design

The RFID system is made up of following four components:

1. RFID cards
2. RFID reader
3. GSM modem
4. Host PC

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2.1. RFID cards

HID's iCLASS 13.56MHz read/write contactless smart cards are used in this project which can be used in diverse applications such as access control, biometrics, cashless vending, public transportation and airline ticketing and customer loyalty programs. The iCLASS card gives iCLASS 13.56 MHz contactless read and-or write smart card technology with the ability to add a magnetic stripe, barcode and anti-counterfeiting features including custom artwork or a photo identification directly on the credential. The cards are specifically designed to make access control more powerful, more versatile and more secure. All radio frequency data transmission between the card and the reader is encrypted using a secure algorithm. By using industry standard encryption techniques iCLASS reduces the risk of compromised data or duplicated cards.

2.2 RFID reader

The iCLASS OEM50 MODULE is a 13.56MHz contactless smart card reader/writer in an extremely compact PCB form factor. With only a two-wire serial interface and a regulated by power supply, an OEM have the power of iCLASS at fingertips. The OEM 50 is specially designed to operate with a wide variety of antenna PCBs. Separating the antenna from the module allows the module may be installed in an enclosure of metal, while the antenna is located behind a non-conductive bezel remotely. Inputs and outputs are all TTL level logic. Transient suppression, voltage regulation and output drivers are provided by the Host device. When used with the iCLASS cards, the OEM50 offers security features such as RF data encryption and mutual authentication using 64-bit keys for each application area. Easily embeddable into small areas, versatile antenna mounting options, read/write iCALSS cards, flexible operational modes, TTL level logic inputs and outputs are the key features of the module.

2.3 GSM Modem

In this project Wavecom modem is used to collect the information from the RFID reader when request is placed from Host PC. This modem enables the card readers to communicate via cellular networks. The modem can communicate via GSM, GPRS+TCP/IP.

2.4. Host PC

The Host PC is connected with Wavecom modem. AT commands are used to get the information from the reader.

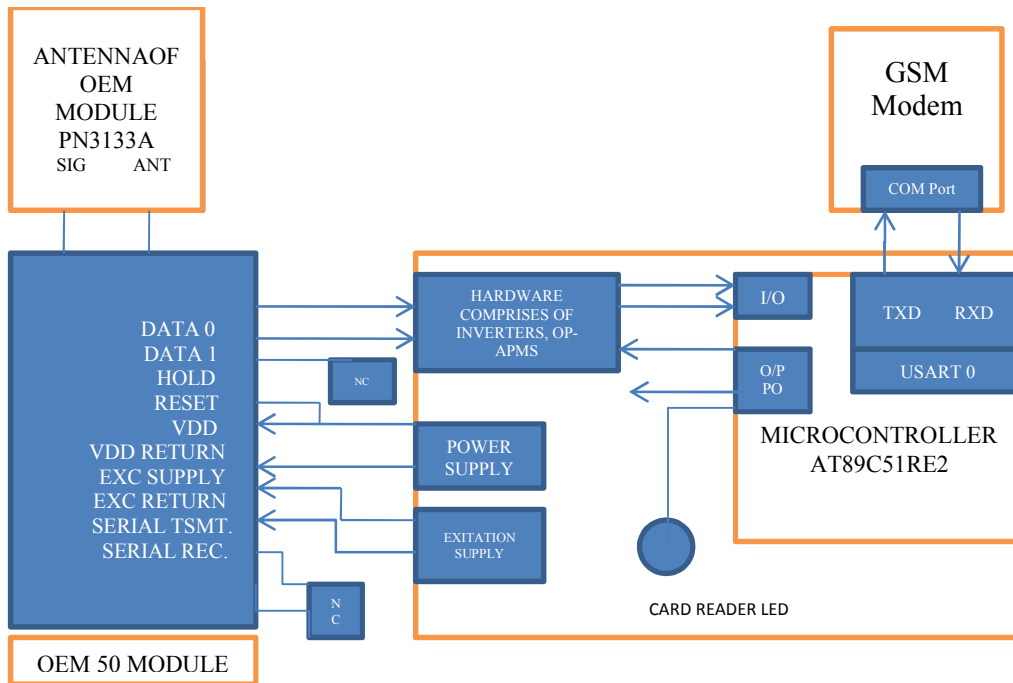
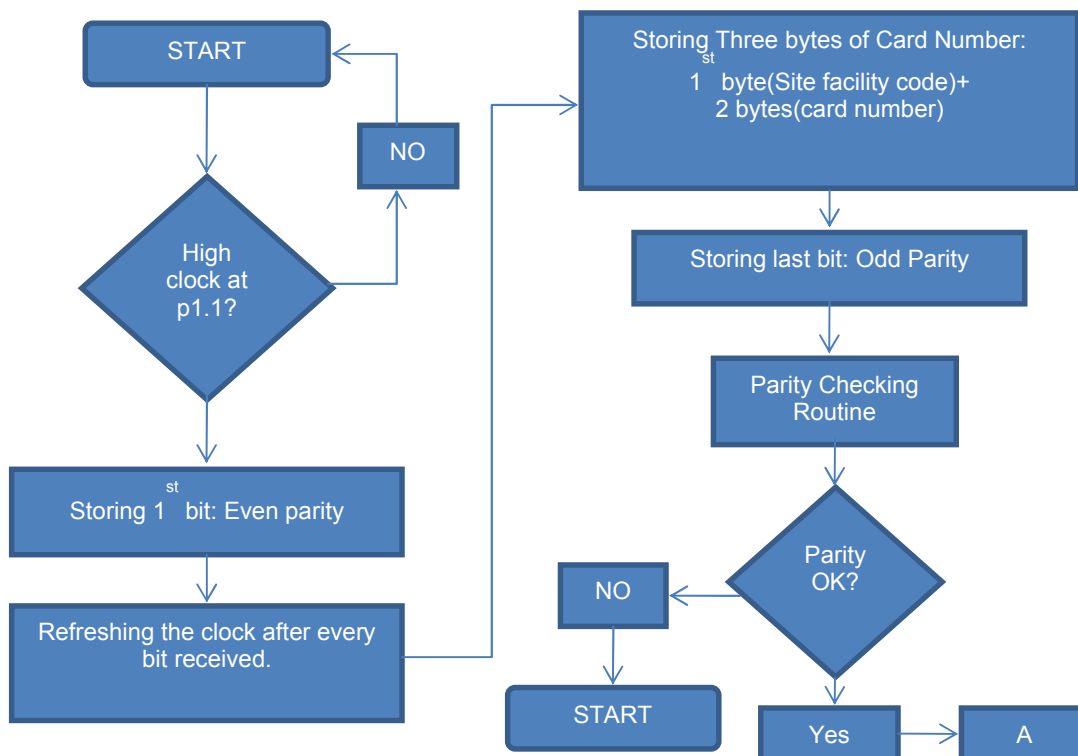


Fig.1. Block Diagram

The micro-controller software flow chart is shown in figure-2. The software is written in C language and compiled using Keil Compiler.



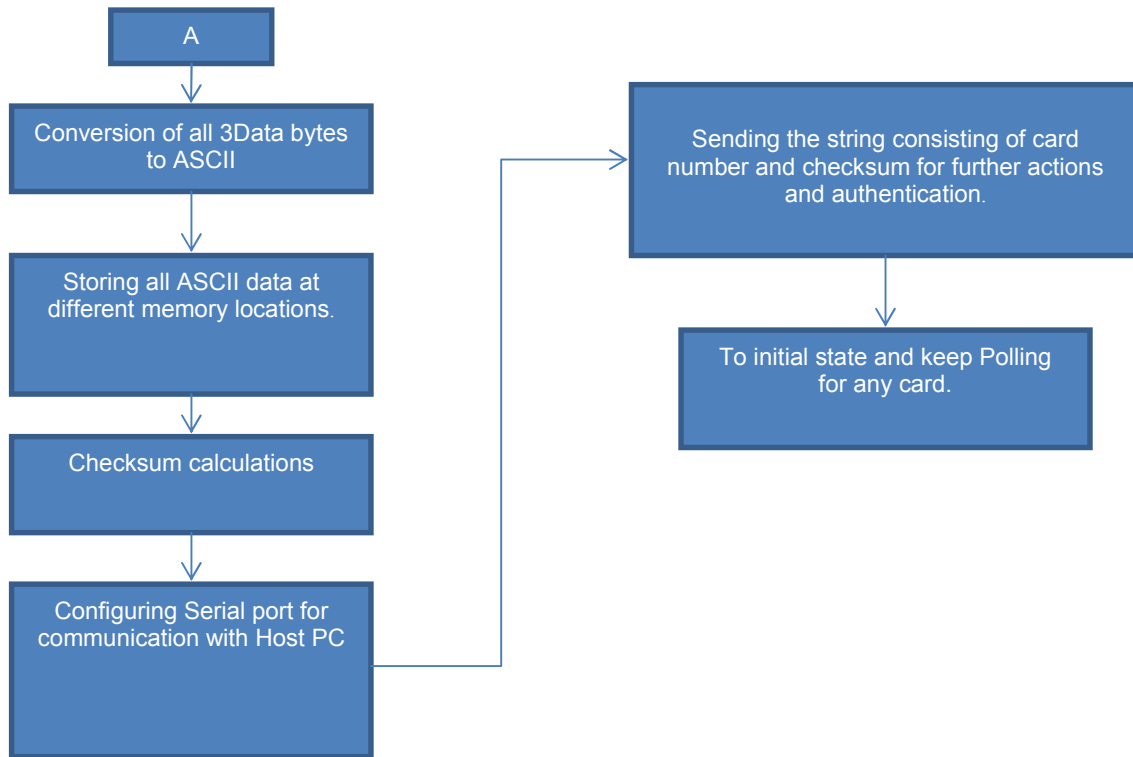


Fig.2. Micro-controller software flow chart

Important Result

The RFID access control system described in this paper has been implemented using custom designed PCB. The main component of the reader board is AT89C51RE2 microcontroller. With the power on of the circuit the bicolour LED glows for 3 to 4 seconds and power on LED glows to indicate the ready condition. The circuit waits for the card to be shown. When card is shown within the range then bicolour LED again glows to show card present condition. The antenna senses the persons of the card and OEM 50 module reads the data from the card and transmits it to the main reader board. The main board receives this 3 byte of data, first byte is site facility code and remaining two bytes are card number. Main board performs checksum calculation of the received data. Store the card number in serial EPROM with current date and time using RTC (Real time Clock). Then controller initializes the serial port to communicate with host computer for further authentication of the card. The Size of the board is 10 cm x 5 cm and weight is 200 grams. The board consumes around 1 watt power. Figure-3 & 4 shows photographs of HID OEM 50 board and micro-controller based RDID board.



Fig.3. HID OEM 50 reader module.



Fig. 4. Micro-controller based RFID board

Conclusion and Future work

RFID based access control system is described in this paper. The RFID system is designed using HID OEM 50 card reader and micro-controller. The user data from RFID card is accessed by micro-controller through card reader and after authentication check, date & time stamping is done. The formatted data is transmitted to main server through GSM modem. After successful authentication, control signals are generated to stepper motor for opening of the gate. The RFID system is implemented using custom designed board with size of 10 cm x 5 cm, weight of 200 grams and power consumption of 1 watt.

For Future enhancement, biometric card reader can be added in system for additional security in authentication. After showing RFID card the user has to put finger on finger print reader, so such dual authentication system will ensure additional security for entry & exit of organization. The other enhancement can be use of Wi-fi instead of GSM for wireless transmission of data.

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