

DEVELOPMENT OF ANTI-THEFT DOOR SYSTEM FOR SECURITY ROOM

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ABSTRACT

The ultimate purpose of developing an electromagnetic door lock is to enforce security features of the entire building structure, equipped with appropriate management control. In this paper I have designed system that allows unlocking a secure door through controlling the "Time Zone". The main aim of this paper is to help users how to improve the door security of sensitive locations, from car parks, shopping centers or corporate head offices to airports, banks or nuclear power plants, while they are not at working places or homes. This paper will focus on programming to lock or unlock the door via PC. Parallel Port programming by Visual Basic 6.0 in depending on "Time Zone" to increase security. Both software and hardware for the system were developed in this paper by using LEDs, electronic circuit, magnetic lock, relays, sensors and some mechanical system to demonstrate the response of the output and input devices. Integration of hardware and software were done to create a simple PC-based control system. A time zone is a user-defined period of time. Time zones can regulate cardholder access, automatically lock/unlock doors, regulate outputs, or arm/disarm auxiliary inputs and supervised inputs.

Keywords: Electromagnetic door lock, Door security, Time Zone

INTRODUCTION

Security is a growing need throughout the world, and lack of security can result in great damage. Many solutions are available for all levels of access control—from highly restricted areas such as banks, or laboratories to less restricted areas such as classrooms (Hawra, 2007). Several years ago, Access Control & Security Systems Integration magazine conducted a survey to determine the state of integration used in buildings at the time. Almost 35 per cent of the 790 individual responding to the survey felt that they had an integrated security system (Basil, 2012). For any control system there is two basic operations the first one picking up the information (data) from around environment (such as factory) by using special electronic devices such as sensors to handle these data, the second make same action to the connected devices according to the result of these information's [1]. Electronic access control is based primarily on three Ws – WHO, WHERE, and WHEN. Bearing this in mind, an electronic access control system regulates who may access specific doors at specified times. Authorized individuals are recognized by a "credential", which could be a card, token, fingerprint, or personal identification number. Acting as a sort of passport, each credential has a unique marker for individual identity. To gain access at a controlled door or entry point, the credential is presented at a reader (Johnson et al, 1996).

There are three important components of access control: identification, authentication, and authorization. Identification is the activity of the subject supplying information to identify itself to an authentication service. Authentication is the second part of a credential set to verify the identity of the subject. These mechanisms could be passphrases, passwords, cryptographic keys, PIN numbers, or tokens. Authorization is the process of determining

what this identified subject can actually access and what operations it can carry out. Authorization is based on some type of predefined criteria, which is enforced through access control lists, security labels, capabilities tables, or user profiles. These three components of access control usually work together in a synergetic relationship and can be found in applications, operating systems, firewalls, routers, databases, domain controllers, and more(Zhou et al,2007).A biometric verification system can make two types of errors :

- a. Mistaking biometric measurements from two different persons to be from the same person (called false match or false accept)
- b. Mistaking two biometric measurements from the same person to be from two different persons (called false non-matching or false reject).

Radio frequency identification, RFID is a technology that is used in many fields' including locks. Modern RFID systems still suffer from radio jamming where a noisy signal causes a congested frequency(David,2008).The two basic types of combination locks are a mechanical combination lock requires aligning one or more movable numbered combination wheels by dialing a correct combination and an electromechanical combination lock may use a microprocessor to process and coordinate the dialed combination with the lock's correct combination(Zhou et al,2007).Currently there is no well-accepted metric for measuring the effectiveness or functional quality of an access control system (Vincent et al, 2006). We can control more than eight data lines via computer parallel port in many ways:

1. The most straightforward method for expanding a single parallel port is to make use of some or all of the data lines of the control register. You send bits to these control lines in exactly the same way as you send bits to the data output lines, except that you use a different address. Normally, you can have up to five sensors attached to the parallel port (Basil, 2012).
2. An apparatus and system which allows multiple parallel port devices to share a single parallel port of personal computer by uses the parallel port signal called Select-in(Hawrra,2007).
3. A multiplexor for use with a computer having a parallel port, for providing multiple separately addressable auxiliary parallel ports.

PROGRAMMING PROCEDURE

This project combined both hardware and software development to create a simple anti-theft door system for the Security room. Basically, a PC interface system to control electromagnetic door lock was developed to be controlled using PC via parallel port communication. Control program will be used to lock or unlock the door. The door is locked when electromagnetic door is energized and vice versa. For this project, the system will be used to lock or unlock the door via PC. User interface is equipped with the LOCK and UNLOCK button to control the door. The door is locked using electromagnetic device. Password is mandatory to get access into the main control panel of the system.

This project will focus on "Time Zone" programming to lock or unlock the door via PC. Port programming which enables interrupt process for the operating system can be used to control magnetic door lock. Port programming and user interface design can be done using Visual Basic 6.0 programming language.

Basically, the idea is to connect magnetic door lock to the PC via parallel port through electronic interface circuit. Then, control software to control magnetic door lock will be developed using any software development programming language. Software is used to activate the output device by a click of a button. Also, output device must be able to be turned

off using mouse click. The system can control up to 8 separate outputs/doors. The parallel port is just one of many ways to interface inputs and outputs to a computer. The parallel port is a very simple and affordable technique in controlling external circuitry. With just a D-Type 25 Pin Male Connector as shown in Figure 1, ULN2003, relays and simple wiring, the computer can be interfaced to the external magnetic door lock (Jan ,2000) .

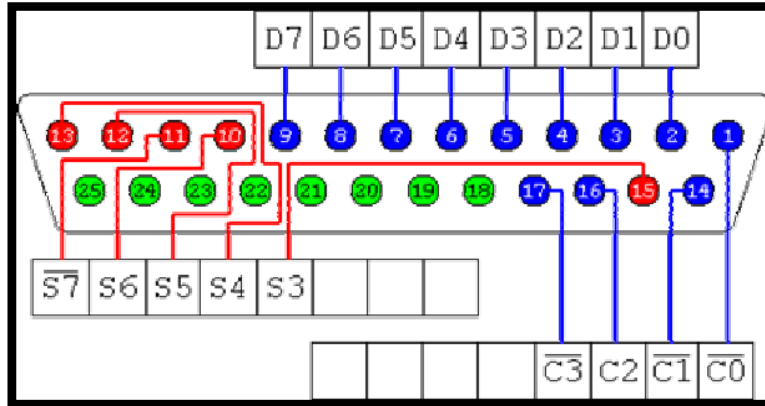


Figure 1. 25-way female D-type connector

The lines in DB25 connector are divided in to three groups, they are Data port, or Data register, (D0-D7) holds the byte written to the Data outputs. Status port, or Status register, holds the logic states of five inputs, S3 through S7, and the Control port, or Control register, holds the states of four bits, C0 through C3. LPT1 is normally assigned base address 378h .Microsoft's Visual Basic has been the most popular choice for Basic programmers developing Windows programs. Unlike other Basics, however, Visual Basic for Windows doesn't include Inp and Out for port access. However, we can add Inp and Out to the language in a dynamic linked library (DLL). A "inpout32" DLL contains code that any Windows program can access, including the programs we write in Visual Basic.

Microsoft's Visual Basic main cods are:

- Out &H378, 1 the door can be opened
- Out &H378, 0 the door can be closed
- INP (&H379) the input from sensor 0 or 1

Magnetic Locks use electric magnets to hold a door closed when power is applied. The locks come in many configurations and vary in door holding force (Zhou et al, 2007). We use a sensor for an interconnected lock assembly which can sense whether the door is in an opened or closed state and the program save the time and date in database table when the sensor state changes. Access control system provides complete control and management of doors, operates 24 hours a day, 7 days a week, 12 months of the year. Here is an example results:

Time Zone Week Operating Time

Sa 00:00:00-00:00:00

Su 08:00:00- 15:00:00

Mo 08:00:00-15:00:00

Tu 08:00:00- 15:00:00

We 08:00:00- 15:00:00

Th 08:00:00-14:00:00

Fr 00:00:00-00:00:00

For that's days and time period the computer parallel port output (out&h378,1) equal to one +5 volt then its increased to 12 volt by I.C ULN2803A and 12v Relay to turn on magnetic door lock then the door can be opened at that's time and date as shown in Figure 2.

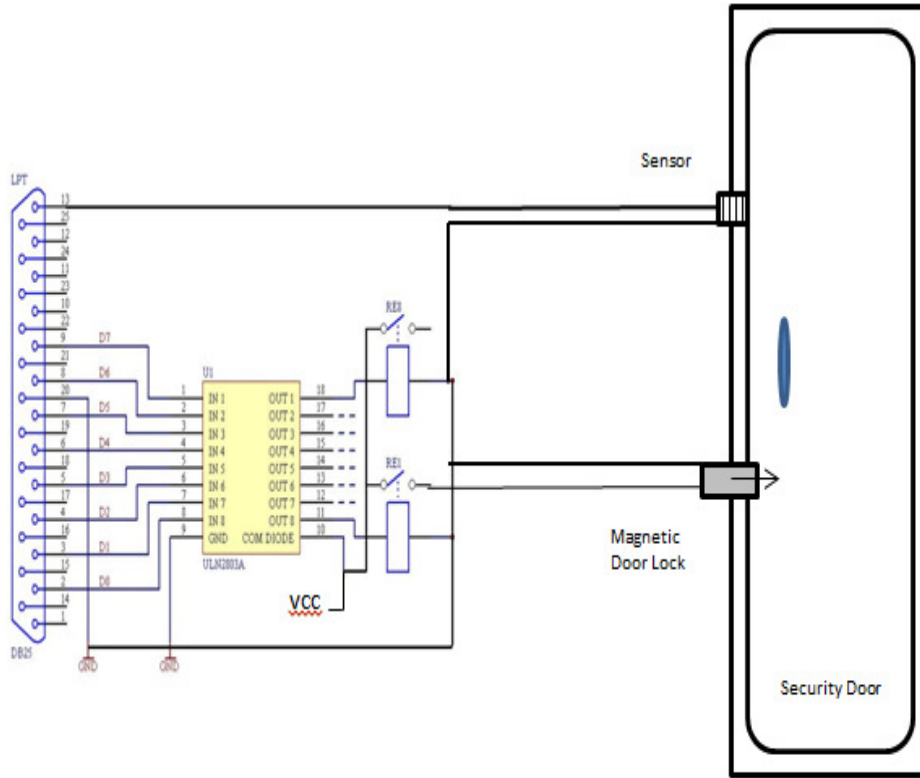


Fig.2: System block diagram

For another days or another times or another date and time computer parallel port output (out & h378,0) equal to zero volt that's mean magnetic door lock stay off and the door can't be open by any user ,if the door was opened by any way the door sensor signal sends to computer parallel port (INP & H379) then the alarm went on and the computer records time and date for that, *that's security we want*. When the program run a login dialogue will appear as shown in Figure 3, to write the administrator username and password

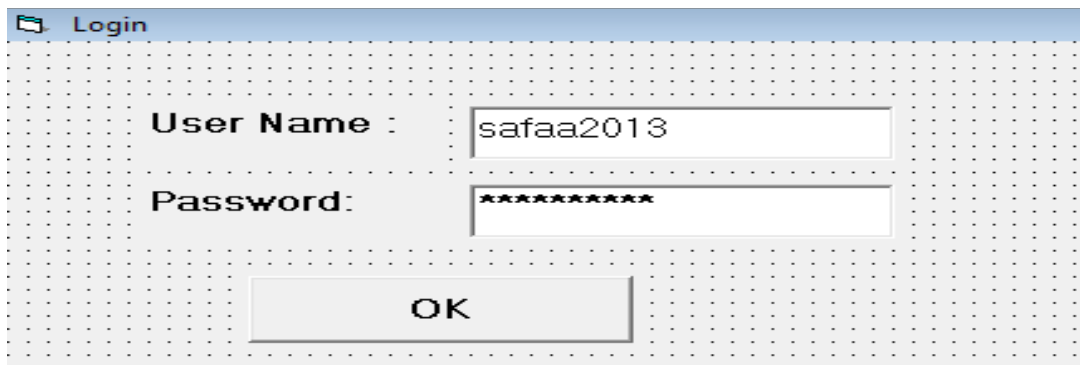


Figure 3. Login dialogue

This control records the events of logging on and also specifies the exact time and date for that. It also records when the alarm goes on, and if an un-authorized action had happened as in Figure 4.

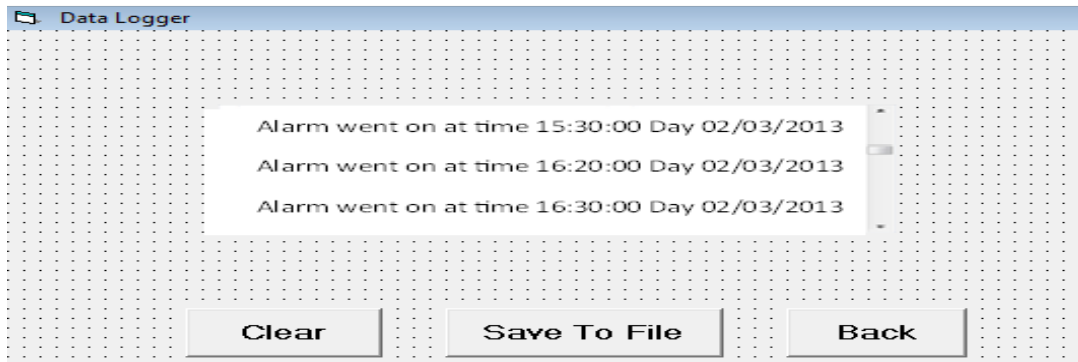


Figure 4. Control records

The administrator can open the door from this panel by clicking the open door button shown in Figure 5.

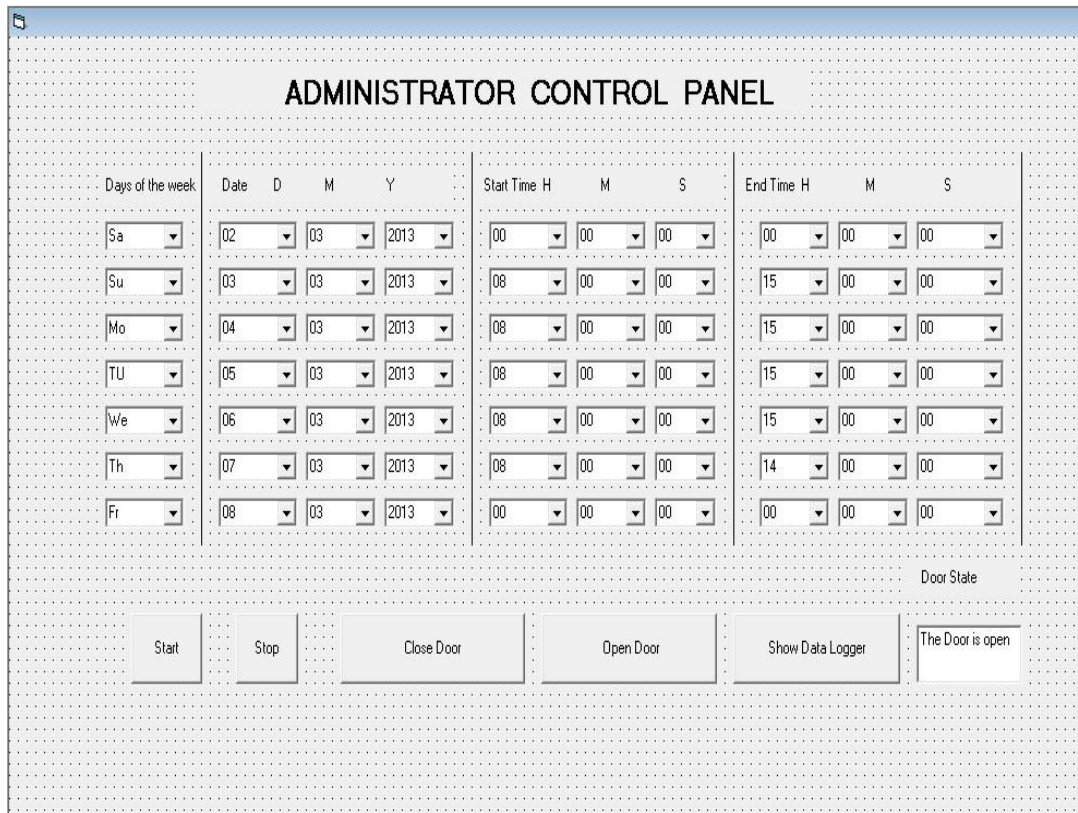


Figure 5. Administrator control panel

CONCLUSION

The system has a great suitable and easy used to increase security in addition to old door lock used specially if there is no one in that place where the security door found .Make electricity as the main source of power to the locks and use battery as a backup for sudden loss of electricity to increase availability. (Davidl, 2008)

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