Implementation of Control System Based on Parallel Interfacing

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Abstract

The fundamental aim of this paper is to design and construct PC based control system. Firstly, the window of this system is designed to display the states of door and window with the setting for start and end time. After setting time, the system reads from three sensors. Three sensors are used to sense the office is under normal or abnormal condition. A password is defense in computer security. When the object is sensed in front of the door during the setting time, the password is requested to open the door. If the password is correct, the door is automatically opened. If not, this circuit outputs a signal to PC saying office is interrupted by some one and the alarm would be rung. When window sensors are motivated in security mode, the alarm is on and the speaker is ringing till the reset command from PC monitor is sent.

1. Introduction

Nowadays automatic system is more used than manual system. Security systems are vital components in safely ensuring of one's environment. These systems are important features of modern homes, offices and buildings.

Security project aims to develop security mechanisms based on human notions of trust, which may prove part of the solution. Modern building contains a large number of sophisticated devices. PC based security control system can operate all parts of the system successfully and systematically. Inputs can be controlled by using variable sensors such as magnetic sensor, infrared sensor. In this security control system, using parallel port is more effective than using serial port and USB. This is more convenient and comfortable and all the data must be displayed on the computer monitor.

This paper is organized with five sessions. Section one deals with Introduction of the System. Section two describes the system hardware configuration. In the next section, section three is presents computerized control system and section four describes conclusions for this paper. The last section points show the further extensions of the system.

2. System hardware configuration

The overall system configuration is briefly represented in this section. The system can be seen to be composed of the following subsystems.

- Automatic sliding door system
- Window system
- Alarm system
- Lighting system

Block diagram of the system is shown in Figure1.

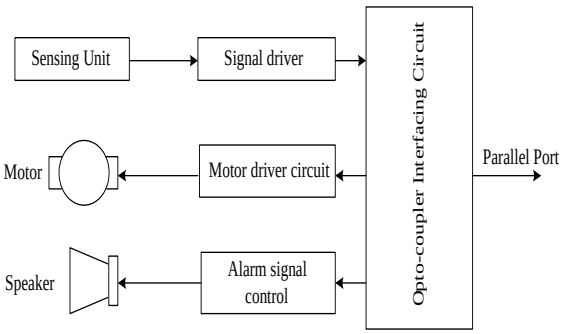

Figure 1. Block diagram of the system

2.1. Automatic sliding door system

IR sensor circuit is used to test the door entry while it is in security control time. Pair of IR transmitter and receiver is mounted on door in the line of the sight. The opening and closing of the door using password is controlled by dc motor through infrared sensor.

If the password is correct, the door must be opened automatically. If the password is incorrect, the alarm system must be rung automatically for security. This system uses the H-bridge DC motor for opening and closing the door of the office [1].

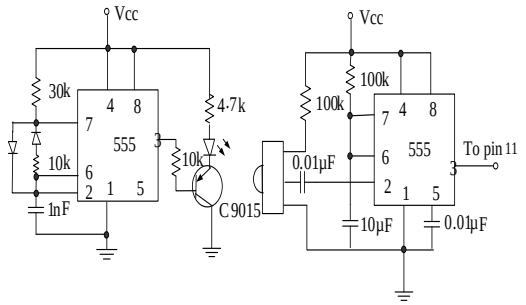

Figure 2. Complete circuit of the IR transmitter and IR receiver

2.2. Alarm system

When anyone reaches in front of the sensor, outside the door of the office, system must control. The operations of the door with password switch by using PC interface.

When the window is opened or broken during the security system is on mode and the door password security is wrong, the signal from this sensor circuit outputs to PC through interfacing by means of parallel port. IR sensor circuit is to test the door entry while it is in security control time. Pair of IR transmitter and receiver is mounted on door in line of sight [5].

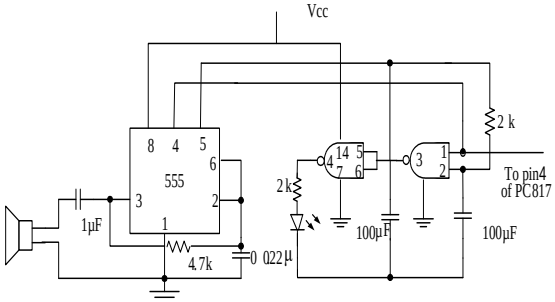

Figure 3. Tone Generator Circuit Using IC 4011

2.3. Window system

The magnetic sensor also called reed switch is used in this portion to sense the state of window meaning whether the office's control system is broken by undesired state or not. The simple design helps to construct easily but efficiently. The states ON and OFF of switch is considered as input of control system and applied for it [2].

2.4. Lighting system

The light system must be automatically opened and closed when the lighting is reached or not. The light bulb system can be produced by using LDR sensor. This design is simple to implement as the lamp is turned on or off by mean of relay circuit.

The light delivered by a light source can be detected by light sensitive device. Such a device is referred to as optical sensor. It absorbs light energy and produces an equivalent electrical signal [4].

2.5. Opto-coupler

Opto-coupler is a combination of LED and a photodiode. An input signal to the LED is converted to varying light which is detected by the photodiode. Opto-coupler control signal partitions power of computer and circuit. In the Opto-coupler, of photon coupled pair, the coupling is achieved by light being generated on one side of a transparent insulating gap [3].

2.6. Parallel port

Parallel port is a simple and inexpensive tool for building computer controlled devices and projects.

The parallel port was originally created for communicating with the printer and thus is called a "PRINTER PORT". A PC may have at most 4 parallel ports, which are named LPT1, LPT2, LPT3 and LPT4.A parallel port (printer port) female connector has 25 pins.

The parallel port is the most commonly used port for interfacing time made projects. This port for interfacing home made projects. This port would allow the input of up to 9bits or the output of 12bits at any one given time, thus requiring minimal external circuitry to implement many simpler tasks.

The port is command of 4 control lines, 5 status lines and 8 data lines. It's found commonly on the block of your PC as a D-type 25 pin female connector. There may also be a D-type 25 pin male connector. This would be a serial RS-232 ports and thus, is a totally incompatible port [6].

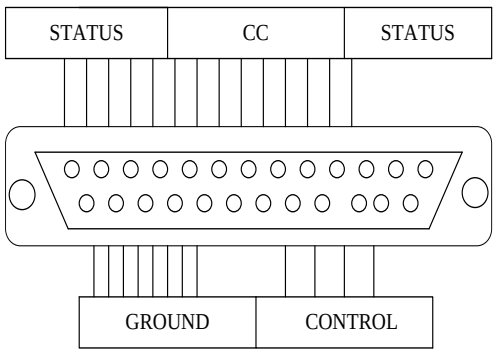

Figure 4. Parallel interfacing

3. Computerized control system

This control system is vital role in success of every retail environments. The main control system is implemented in software written in C# programming. For systems with fewer than thousand of instructions, a useful aid is to represent the algorithm by means of a flowchart. Figure 5 shows the main flow diagram for this system.

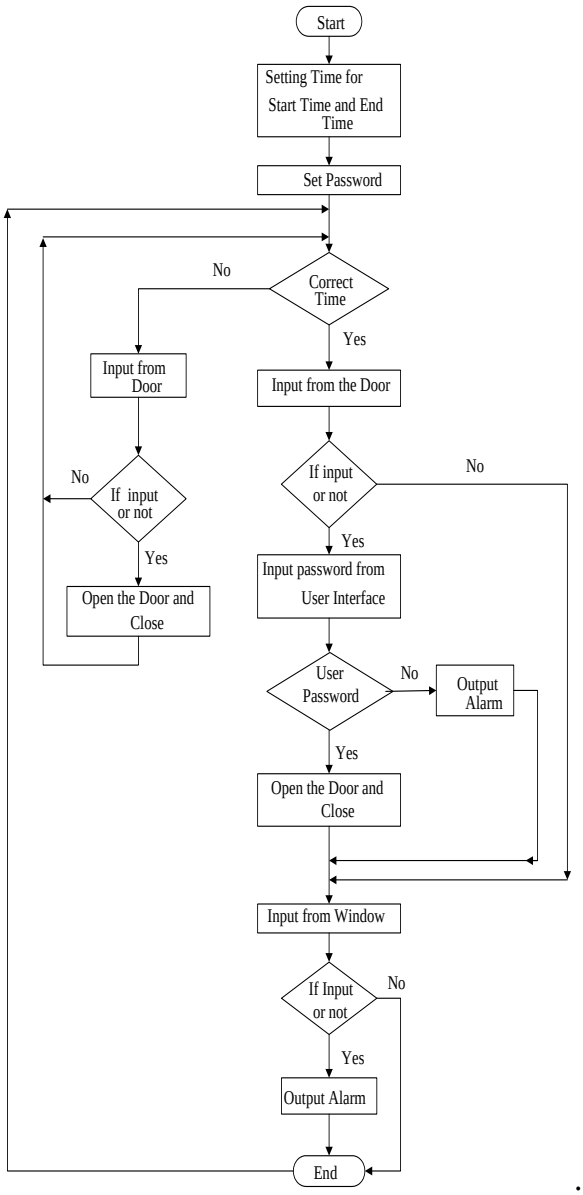

Figure 5. System flow diagram

When the system starts user must fill in their start time, end time and password appropriately. When the system is on it receives input signal from doors and windows. When the system receives signal from door it requests for password. If the password is incorrect the system starts to ring the alarm. The system allows to open the door only if the user key in the password correctly. The system is automatically close the door as soon as the user enter. The system rings the alarm when the input is come from the window. The user can arrange the time interval for the system not to arm the alarm bell and allows the input from the door without requesting for password.

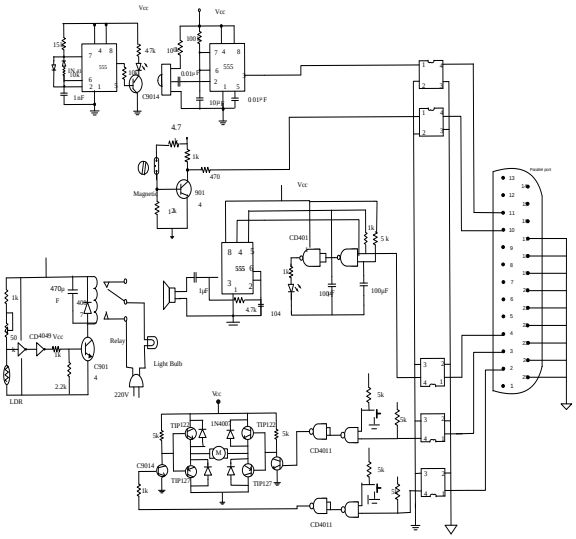

Figure 6. The overall circuit diagram of the system

Figure 7 shows the first home page of the system as soon as it the system is run. The window of system is designed to display the states of set time, set password and reset button with the setting for the start and end time. According to the system time, the system is in active mode. After setting the time, the system reads from three sensors. The system command load circuits as programmed before and display about it using color to point out they are operating.

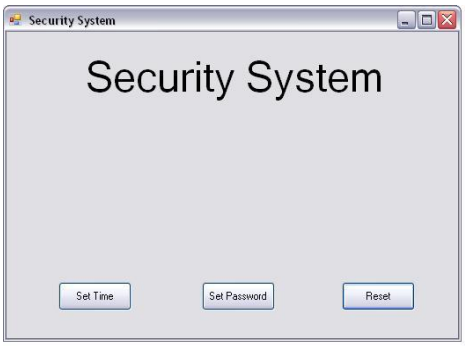

Figure 7. Home page of the system

When anyone reaches in front of the door within setting time, the user gives the correct password. If the person is entered the password to the security door, the system check with the private key, password and private key all are matched. If they

are corrected, the system is allowed to pass the door, it is shown in figure 8. If not, the alarm must be rung, it is shown in figure 9. While the window is opening the alarm must be rung and the monitor must be displayed that is input from the window, it is shown in figure 10. The reset button is to turn off alarm system by the user and the close button is to exit the window.

While the user uses the system except setting time. If anyone reaches in front of the door, the system is allowed to pass the door and don't need password, it is shown in figure 11. While window is opening, the monitor must be displayed input from window and the alarm must not be rung, it is shown in figure 12.

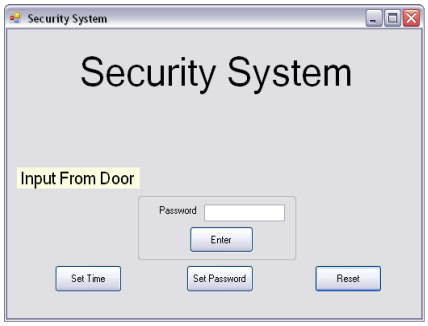

Figure 8. Input from door at setting time

Figure 9. Wrong password

Figure 10. Input from window at setting time

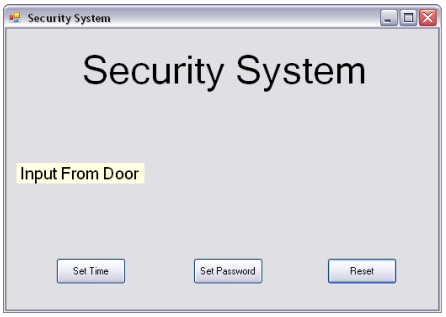

Figure 11. Input from door except setting time

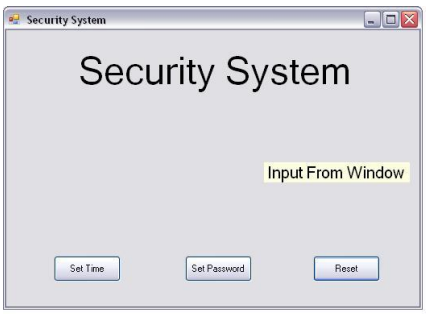

Figure 12. Input from window except setting time

Figure.6 shows the schematic diagram of the PC based security control system. The application is for office security and the design is implemented and performance is shown by constructing a small model. Parallel port is used for interfacing between circuits (sensor units and load units) and PC which implements the desired control system. The data register bits are output from the computer and is used to apply the necessary control signals to the circuits of the system. There are totally two signal bits to be input into the computer system; one is from magnetic sensor and one from the IR sensor. Three sensors are used to sense the office is under normal or abnormal condition. Magnetic sensor (reed switch) is mounted on window of office model. When the window is open or broken during the setting time is on mode, the signal from this sensor circuit outputs to PC through interfacing by means of parallel port. IR sensor circuit is to test the door entry while it is in setting time. Pair of IR transmitter and receiver is mounted on door in line of sight. When the object is sensed in setting time, this circuit outputs a signal to PC saying office is interrupted by some ones. When any one or both of these door and window sensors are motivated in security mode, the alarm is on and the speaker is ringing till the reset command from PC monitor is sent.

4. Conclusion, limitation and further extension

The content of this paper addresses to design and construct the office security control system using low cost sensors and the application can be extended to a wide limitation of usages in other fields. There are many permutations of security systems that can be installed in either the office, private home or supermarket. The construction of circuit, design of the control system and experimental investigations has been reported. Sensor units including magnetic sensor, Infrared sensor and magnetic sensor are integrated to sense the interrupt of unwanted condition and report as inputs of control system. Parallel port DB 25 accepts the sensors outputs in digital form and allows for the whole operation.

Troubleshooting and modification can also easily be done. Motor on/off is limited by delay time and if the LDR is applied near infrared sensor, the light would be shadowed on the infrared sensor. This control system can also modify for the various types of function of this system. There are employ smart cards, touch keypads and biometric access control units such as fingerprint readers, eye readers and so on.

5. References

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