A MICROPROCESSOR-BASED GATE SECURITY SYSTEM

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Abstract

A microprocessor-based security system for gate control in a housing estate is described in this paper. The system provides efficient gate access and estate control to perform the job of the gate security guard. The hardware and software development of this system is presented.

Introduction

A typical way of managing the gate of an entrance to a compound is through the use of a security guard. To provide automatic control for the entry points for a housing estate, a guard-free microprocessor-based system [1] is developed. Besides performing the job of a typical commercialized electronic security system, identification of a visitor is done mainly through direct communication with the unit of the housing estate concerned. The dialing up to the units through the hands-free telephone at the gate is generated by the system. The tenants of the units reserve the right to let the visitor into the compound by controlling the gate using the telephone set. For security reasons, interactions at the gate will be logged onto the system. A hardcopy of these visits can be obtained for verification purposes. This microprocessor-based security system can be expanded to monitor movement of personnel or visitors in a multi-entrance environment.

Design Objectives

The hardware construction involves the implementation of a hands-free/handset, auto-DTMF dialling telephone board to link up the exchange to a microprocessor-based card. Interfacing to the CPU are a printer, real time clock, I/O peripheral devices, and a display board. The emphasis of the software development was geared towards a user-friendly system, to ensure system security, to facilitate data edition and manipulation and efficient memory management, and to provide effective control of the system.

System description

Fig. 1 shows the block diagram of the microprocessor-based gate security system. There are several circuits that are interfaced to the microprocessor board, and these include the telephone line, duplexor,

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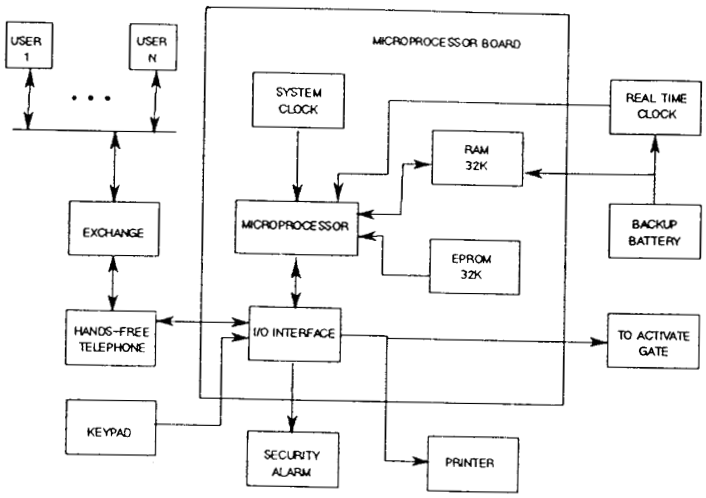

Fig. 1 Block diagram of gate security system

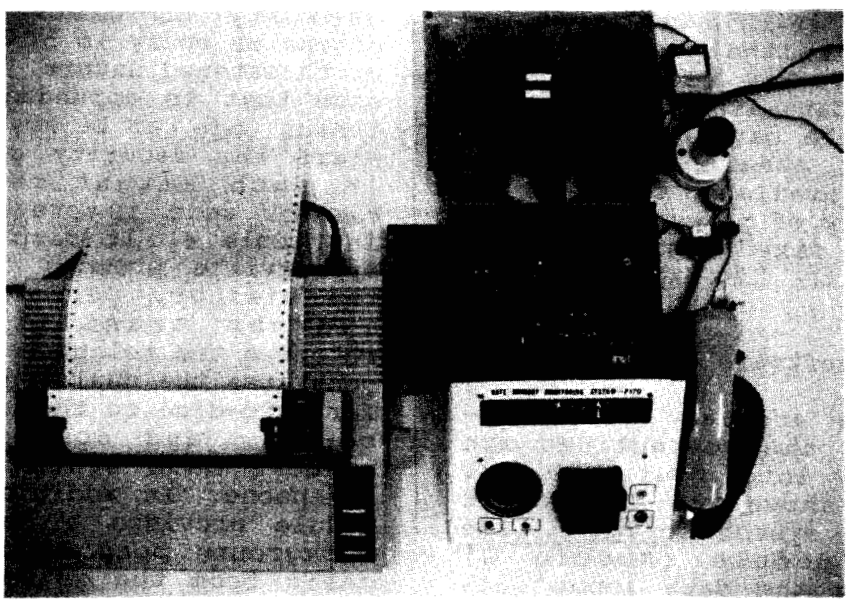

Fig. 2 Prototype of system hardware

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voice/speaker, DTMF/Pulse dialler, buzzer ringer, DTMF receiver, and speaker amplifier circuits. Fig. 2 shows the photograph of the prototype for the system, which includes the microprocessor board, interface circuits, a hands-free/handset speakerphone, a keypad with LED display, and a printer.

There are several modes of operation, and these have been classified under the different user groups for the system. The visitor mode, as the name suggests, is for visitors and their identities should be acknowledged via communication with the unit-owners. The tenant mode is for people who use the facility frequently. They are either the owners of the units or employees of a company, if this system is installed at the premises of a company. For access to the system database to update or change the data, a management mode is available. Another mode is available to restrict the entry of personnel according to fixed time periods. This is the time zone mode.

System software design

Using a modular design approach, the subroutines are grouped into four modules. Fig. 3 shows the flow chart for the system software. The first module (Module 1) provides the data input section for the system. The program initially requests for the tenant and identification codes. The storing of codes is repeated until all the specified number of units of the block are entered. The time zone codes are also stored during invocation of this module. Module 2 is the management mode. Among other things, this module allows for the alteration of the telephone number of the unit, adjustment of the call time limit between visitor and tenant, data logging of the time and codes upon entry to a printer. It also prohibits the use of the system for long distance calls and allows access to the system data bank by management only with a code and key. The tenant mode is implemented in Module 3. In this module, the program prompts the tenant for the access code. A check is then made and if valid, the program requests for the identificaon code. The gate is then opened once this code is verified. This mode also offers the facility to check if the access or entry is of a forced or threatened nature. An alarm code that is appended to the tenant code can be keyed in to alert the security personnel in such situations. The visitor mode is provided for in Module 4. It displays the appropriate prompts to guide the visitor, performs the address translation to retrieve the telephone number, generates the dual tone timing for auto-dial to the unit concerned, and controls the up/down hook status of the telephone. In addition, this module provides a continuous background beep to indicate calls from the gate and accepts the generated keycode from the tenant to acknowledge the identity of the visitor before the gate is opened.

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Conclusion

A microprocessor-based gate security system has been developed and is presented in this paper.

Acknowledgement

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Reference

1. P S Lim and K Y Chua, "Microprocessor Based Gate Memory Telephone Monitoring System", FYP Report, NTI, Feb. 1989.

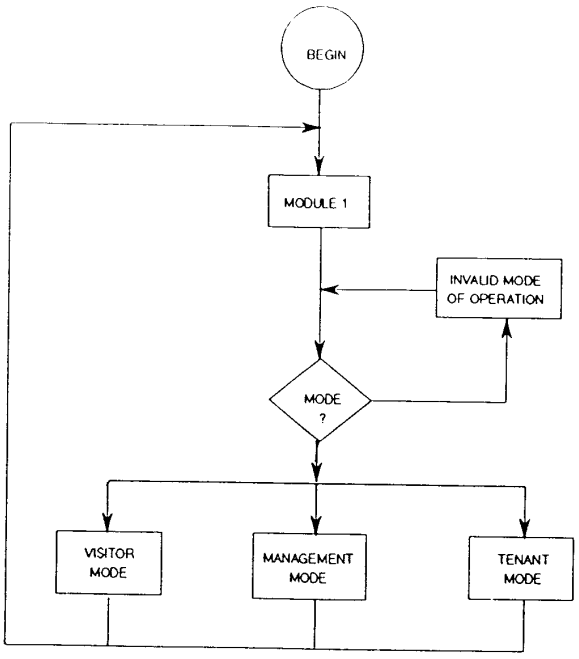

Fig. 3 Flowchart for system software

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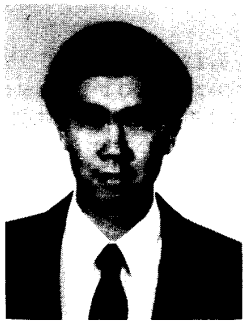

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