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DISTRIBUTED SENSOR NETWORK FOR SECURITY SYSTEMS

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Abstract: *the low-cost network controller for security systems detectors was designed. The controller's specifics lies in two-wired network interface with the "common bus" topology support. This design reduces the amount of data communication channels from detectors.*

Keywords: *Security systems, network controller, two-wired network.*

1. INTRODUCTION

Security systems and systems that prevent non-authorized access have become tremendously popular [1]. As a result, a great diversity of such systems has been created with many different functional characteristics [2]. This has led to the construction of the complex security systems that defend against many types of threats, and which combine different subsystems into a coherent whole.

Traditionally security systems have a "star" topology, so there is a substantial expense in providing the cables [1, 2]. It is possible to reduce the number of cables and whole price of the system using a network controller which interfaces detectors of security systems. It will allow to create security systems that have a "common bus" topology where informational signals and power supply are provided by two-wired network. Thus, the total length of cables will include the distance between two most remote detectors and sum of branches to each detector.

This paper describes the distributed sensor network (DSN) architecture design based on the security system detectors described below.

2. ARCHITECTURE OF DESIGNED DISTRIBUTED SENSOR NETWORK

Architecture of the designed distributed sensor network consists of a proposed network controller and a network adapter [3]. The network controller should provide following functions:

- output signals processing of different type and operation principle security detectors;
- to support the specialized wired network of security detectors with a "common bus" topology and supply power through the communication lines.

Network adapter should provide data communication and power supply of network controllers and detectors.

The general structure of standard component of the designed DSN based on proposed universal network controller *UNC*, that interfaces the detectors (sensor units, *SU*) of security systems (fig.1), consists of the sensing elements $S_1 \ldots S_n$ of detector *SU* that interfaces the analog processing circuit and processor *(APCP)* which transmit results (detection/non detection) to output circuit sensor unit (*OPSU*). The microcontroller *MC* interrogates output circuit sensor unit outputs and interacts with the network by hardware tool of serial interface *IF HW*. Power supply *PS* provides power to all of the elements.

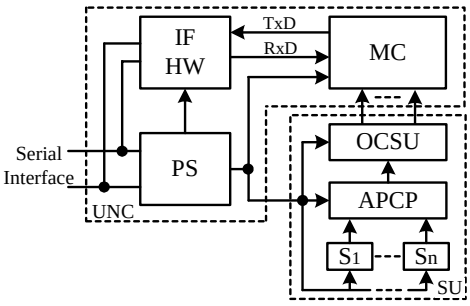

Fig. 1 – Standard component architecture of the developed DSN

It is proposed to use in the developed controller the modified serial RS-232C interface described in [4, 5]. This interface can be supplied with power in the same manner as the 1-Wire interface provided by Dallas Semiconductors [6].

During its work the network server takes turns communicating with the controllers of the security system, sending appropriate requests using its serial interface. Server inquiry goes to the microcontroller *MC* via circuit *IF HW*. *MC* interrogates the outputs of the output circuit sensor unit for detection of sensing elements $S_1 \ldots S_n$, and then forms a response out of the collected data and sends it back to the network server. At the same time *PS* forms from server requests power supply for the controller and detector.

3. DSN IMPLEMENTATION USING SECURITY DETECTORS

Standard component of developed DSN (fig.1) which include security detector SRPG-2N and network controller (fig. 2) can work in two-wired networks with the "common bus" topology that provides power supply for detectors using the network. Total number of detectors is less that 64 where each can have more that one sensing element.

Fig. 2 – Component of DSN based on SRPG-2N detector with connected network controller

Block diagram of DSN (fig. 3) consists of personal computer (network server) that executes the central panel functions and has one or more COM-ports to which the network adapter is connected. The network adapter is connected using two-wired network with each component of DSN.

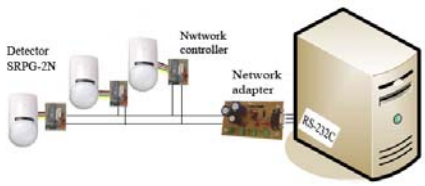

Fig.3. Block diagram of designed DSN.

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4. CONCLUSION

A universal network controller and a network adapter was developed. Together with traditional security detectors it allowed to implement the distributive sensor network with "common bus" topology. The advantage of the proposed solution is reduction of the cabling amount and security system equipment costs. Thus, developed controller and network adapter has a simple design and designed using low-cost components.

5. REFERENCES

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