AUTOMATION WIRELESS REMOTE CONTROL

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Abstract: The paper presents the realization of an automation solution with wireless remote control. Often to achieve automation systems it appeals to the distributed automation systems. This solution is typically used when there is a central control point with a high computing power and more remote distributed points with simple computer systems. The connection of the distributed points with the central control point can be achieved by using the specialized process bus or by the radio. Wireless connections are especially useful when the commanded items are mobile. Modern robotic environments are equipped with mobile robots moving in a certain area to perform various tasks. For example, a robotic domestic environment can have a smart refrigerator, a smart washing machine etc. but also a mobile elements such as an intelligent vacuum cleaner, an intelligent domestic robot etc. These elements require one or more data networks for exchange of information and commands.

Keywords: wireless, microcontroller, network, automation, communication protocol.

1. INTRODUCTION

The automation environment is made up of several mobile robots which need to send remote commands. The command is sent from the fixed central point to mobile robots. For this purpose it is developed a star network type with a fixed central point. The communication between the mobile robots is achieved through the central point. The main problem which solves the wireless network is ensuring the safety and the control to the sent commands [1]. This is achieved through the implemented networking protocol [2].

2. THE WIRELESS IMPLEMENTATION

To achieve the wireless network were used for each node the MSP430G2553 Texas Instruments microcontroller and the radio module AIR. To this structure was added a local keyboard for entering the commands and an LCD display for the local information's. The central module is provided in addition with a serial interface to connect to PC (Personal Computer). The principle wiring diagram is shown in Figure 1. Figure 2 shows the network topology.

As shown in Figure 2, the central point is communicating with the mobile robots. This is done via the AIR radio module that allows the duplex communication between the central point and the mobile robot. Communication between the central point and the mobile robots are made successively with each mobile robot.

The keyboard interface is performed on a single wire. This was done in order to use as few connections of the microcontroller. The reading of the keyboard is done using the analog to digital converter built into the microcontroller. Due to the resistive network at the touch of a key is send to the microcontroller a different voltage level. In this way the microcontroller can determine the key pressed.

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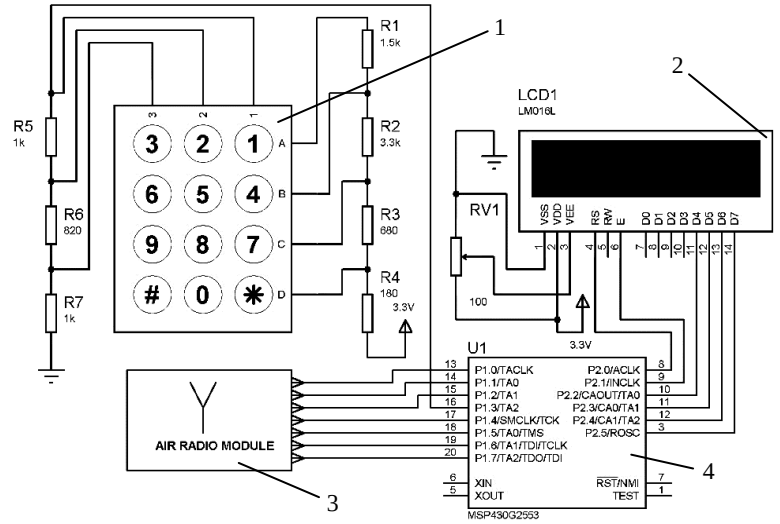

Fig. 1. The principle wiring diagram: 1-keyboard; 2-LCD display; 3-AIR radio module; 4- MSP430G2553 microcontroller.

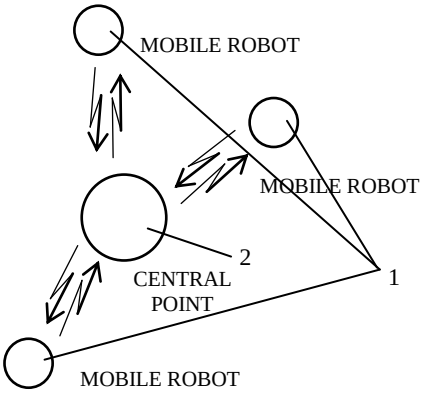

Fig. 2. The network topology: 1-mobile elements of network; 2-fixed point of the network

3. THE PROTOCOL USED

To the each mobile robot is assigned a different address for communication on the same channel. This is possible because the TI CC110L circuit is built into the AIR Radio Module. The communication between the fixed point and the mobile elements is based on the situations described below.
The central sends a command but received no answer. The communication is based on the principle of issuing and receiving order confirmation response. If you do not receive any response the central unit concludes that the item is defective or missing and make the appropriate signals and actions.
The central point sends a command and receives a response but that it is not a confirmation of the command execution. In this situation, the system notes the existence of the connection. Because he has not received a confirmation of the command execution, it will be submitted again.The central point sends a command and has received the confirmation of its implementation. This is normal operation. Each the network node have assigned an address and sends the communication parameters periodically so that the central point can supervise the network.

4. CONCLUSIONS

Using the Texas Instruments components allows the use of the technology Ultra-Low Power Consumption. In this way, the wireless communication system has a very low energy consumption. The system enables the increased operational safety of the automation by introducing additional control elements. The results of experiments show that the safety communication increases due the protocol implemented. This leads to a higher level of the quality of the automation achieved [3].

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