

An Improved Algorithm for Ad hoc Network

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Abstract. The technology of wireless sensor network is a new direction in the field of information science. With the development of science and technology, in modern life, its application is more and more widely. The technology is usually used for information communication in a wide range of network. Sensor network communication can be completed without interference. This paper proposes an efficient, stable self-organizing network protocol algorithm in the situation, to realize self organization and information communication. Using STM32 microcontroller as network nodes, it achieves a low power, high speed, high performance wireless ad hoc network, the node and terminal can form a stable network communication, and quality of the network communication can be further improved.

Keywords: Wireless network; self organization; microcontroller; sensor;

1 Introduction

The wireless network is composed of a group of mobile nodes with wireless transceiver components, it is a self-organizing and multi hop network . Compared with other communication networks, wireless ad hoc network has no center, self-organizing, multi hop routing, dynamic topology and other characteristics. It has no cable fixed base and each node can be used as a terminal and routing which can switch fast and movie at any time.

2 Design principle

This design uses STM32F103 MCU and does not need the complex hardware circuit. It will send and receive datas by the serial port 2 which is connected with the wireless module. The design realizes the network between the multi nodes and terminal by using a self-designed algorithm. It includes a terminal and a plurality of nodes in the system. The terminal is always open. If the connection is failed, the node will try to connect with other nodes which are in the network. If succeeded, it will transfer data and help the nodes in the blind spots connecting with the network. Figure 2-1 is the block diagram of the terminal. Figure 2-1 is the block diagram of the nodes.

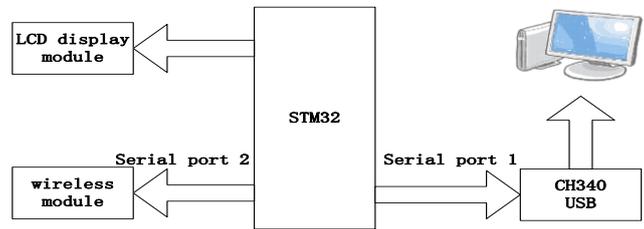


Figure 2-1 the block diagram of the terminal

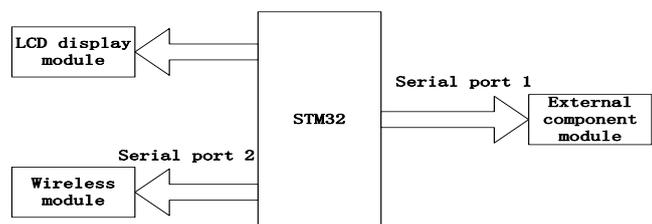


Figure 2-1 is the block diagram of the nodes

This algorithm can ensure the communication between nodes and terminal can connect through other routes network when the signal interference happened, and search the blind spot where the nodes cannot reach. Figure 2-3 is the system network structure diagram.

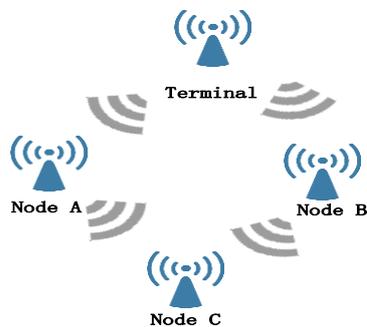


Figure 2-3. diagram of the system network structure diagram

In the diagram, the node A and node B can communicate with a terminal network, and node C is out of the transmission range in the terminal signals but in the the transmission range of the node A and B. So the node C can connect with the network through the node A and B.

3 Self organization protocol

The network includes a terminal connecting with PC and multiple nodes. After tuning

on power of terminal and the initialization, enter the mode waiting for the command. Nodes can be arbitrarily placed, after power on and initialization, nodes firstly send a request command of connecting with the network to the terminal, if the terminal confirmation command is received, it have been accessed to and do the operation in the network. If in the set time, it can't receive terminal confirm command, that node thinks itself as the blind spot, the node will send the request to the other network node, if the received the node confirm command, have been in the network and saved the address of node. Other node network courses are the same, each node can mount a number of node, the networking can send commands to every node. Self-organization process is shown in Figure 3-1.

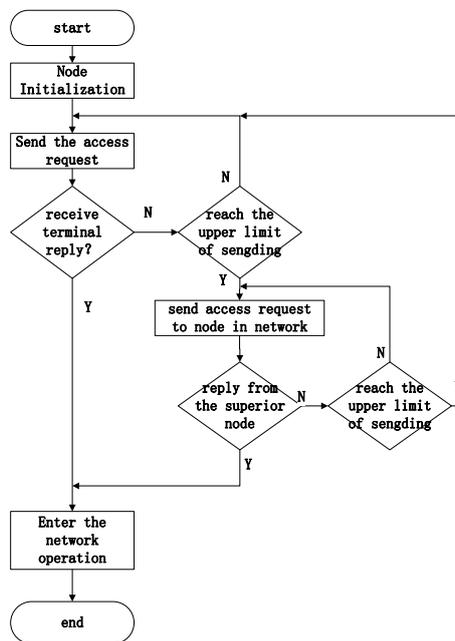


Figure 3-1. self-organization process

4 Software design

Terminal program includes three parts. First, displaying the datas receives from terminal through serial port 1 in the PC. Second, inputting the command from PC and sending it to the specified node through terminal. Last, deal with the application of nodes. Figure 4-1 is the flow chart of terminal program.

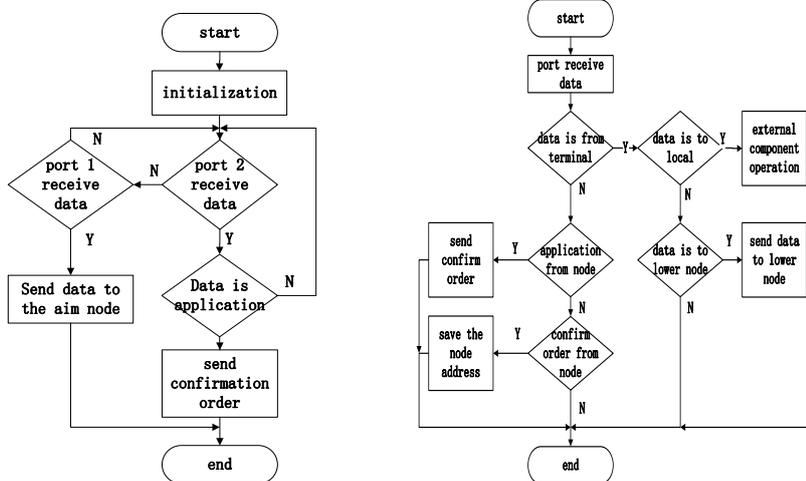


Figure 4-1.the flow chart of terminal program Figure 4-2. Network operation flow chart

The node program includes network and network operations in two parts. Network connection flow is as networking process described in the above. Network operations include reply to the request of lower node, send the blind node's address to the terminal, transmit the terminal command to the node, judge the command which is terminal sends and send command to the external module. Network operation flow chart is shown in figure 4-2.

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