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## New Multifunctional Industrial Wireless Network Adapter

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### Abstract

Design has realized a new multifunctional industrial wireless network adapter. The purpose of this design is to avoid the isolated information island in an industrial system, and allow devices with different types of communication protocol to form one industrial network. It has realized by hardware and software. On the hardware side, the device is composed of MCU, power supply module, two rs232 communication modules, one rs485 communication module, two ethernet communication modules and the watchdog. On the software side, the adapter integrates the protocols of Modbus TCP, Modbus RTU, rs232 transparent transmission, rs485 transparent transmission, TCP server transparent transmission, TCP client transparent transmission and UDP transparent transmission. Because the device has realized the calibration algorithm, it can control rs232-HART protocol converter to achieve interconnection of the HART equipment. One of the rs232 port is used to interconnection of a wireless communication module. The wireless communication module is designed by ourselves, the wireless modules can automatically form a network of each other and communication with the host. Now the multifunctional industrial wireless network adapter has been tested and verified that it can make multiple equipments with different communication protocols form one network and works steadily.

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*Keywords:* industrial wireless network adapter; Modbus TCP; Modbus RTU; TCP; UDP; rs232; rs485; wireless; HART

### 1. Introduction

In the metallurgical and petrochemical complex production process, there are many process parameters needed to be measured [1]. But the current level of the domestic industry is still relatively low level of intelligence, the situation is still prevalent in manual meter reading. Production parameters of the collection and feedback process is

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slow, which greatly reduced the industry's capacity to save energy and reduce emissions. In order to achieve the goal of fine-grained control and collaborative optimization in the complex and multi-links production system, it is necessary to achieve the unified acquisition and control of multi-links production parameters, and the unified industrial network of each production process device.

However, the current status of industrial production environment are, the communication protocols of the field devices are not uniform, the old devices even do not have unified wireless network interfaces [4]. It is not realistic to replace all the field instruments with a new one with a unified network interface, which requires a lot of manpower and money [5]. Therefore, there is an urgent need for a kind of industrial networking service adapter, which support a variety of communication protocol interfaces, used to achieve the function of forming a unified networking of different devices with different industrial communication protocols.

This paper has developed a new multifunctional industrial wireless network adapter which supports Modbus TCP, Modbus RTU, HART, rs232 transparent communication, rs485 and ethernet transparent communication. The adapter can simultaneously control a variety of devices at the same location. It has a strong ability to adapt to the protocols and the practicability, reliability of the adapters have been confirmed by the practical verification.

## 2. Hardware design Of multifunctional industrial wireless network adapter

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According to functional requirements, this multifunctional industrial wireless network adapter has been completed the hardware design, the physical diagram of the adapter is in the “TEST RESULTS” section. The hardware structure graph is shown below in Fig.1.

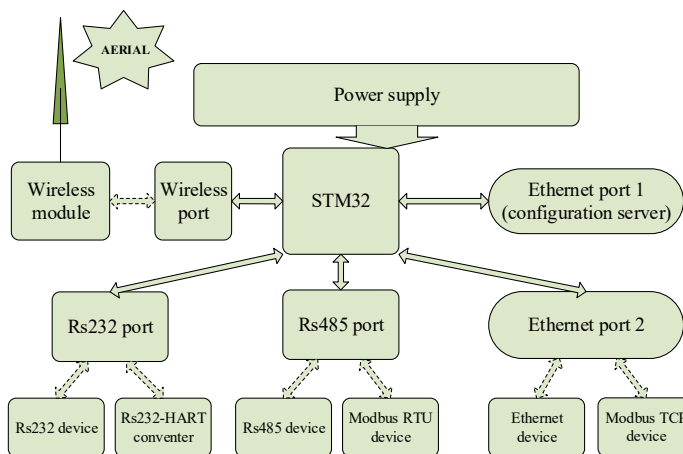


Fig. 1. The hardware structure of the new multifunctional industrial wireless network adapter.

As shown in Fig.1, the hardware design of the adapter includes power supplies, microcontroller unit circuit, rs232 interface circuit, rs485 interface circuit, wireless module interface circuit and two ethernet interface circuit. The microcontroller unit is one of the STM32 series chips. The chip has large market share and high price-performance ratio. The wireless module interface is defined by our own project team, we can choose 2.4G or 470M

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