Remote status monitoring based on ESP8266 connected IoT cloud platform

Haichen Hu\textsuperscript{1} and Yinghao Li\textsuperscript{2}

\textsuperscript{1} School of Mechanical Engineering and Automation, Northeastern University 3 Wenhua Street, Shenyang 110819, China
\textsuperscript{2} School of Mechanical Engineering and Automation, Northeastern University 3 Wenhua Street, Shenyang 110819, China

*Corresponding author’s e-mail: 709902154@qq.com

Abstract: This paper applies the Internet of Things cloud platform technology to traditional state monitoring. The method of accessing the cloud platform through the ESP8266 module is proposed. This method reduces the requirement of the longest connection distance of the intelligent monitoring connection mode, and improves the rapidity of remote monitoring, and improves the real-time and convenience of monitoring target monitoring as a whole.

1. Introduction

Internet Of Thing\textsuperscript{[1]} is a network system that connects all things that need to be connected, monitored, and communicated based on various information sensors through Internet technology to form an Internet of Everything. In terms of connection methods, there are GPRS, zigbee, Bluetooth, CAN bus and other methods\textsuperscript{[2]}. There are the following disadvantages: the stability of GPRS is relatively poor; the longest connection distance between zigbeehehe and Bluetooth is limited. In such a case, a longer distance and higher stability connection method is required to achieve remote temperature and humidity monitoring. The solution of this paper is to solve the problem of poor stability and connection distance of traditional state monitoring through the ESP8266 connected IoT cloud platform. At present, the most suitable hardware connection method is to control the ESP8266 to connect to the wifi through the AT command\textsuperscript{[3][4]}. After connecting to the IoT cloud platform, the status monitoring can be realized, and the mobile phone and the computer with the privilege can be used as the lower computer to view the monitoring data\textsuperscript{[5]}.

2. Connect the Internet of Things cloud platform

2.1 hardware selection

This article selects ATK-ESP8266, ATK-ESP8266 module use serial port (LVTTL) to communicate with MCU (or other serial device), built-in TCP/IP protocol stack, we can realize the conversion between serial port and WIFI. Through the ATK-ESP8266 module, the traditional serial device only needs a simple serial port configuration, and the data can be transmitted through the network (WIFI). The ATK-ESP8266 module supports LVTTL serial port and is compatible with 3.3V and 5V MCU systems, which can be easily connected to your product. The module supports the mode of serial port to WIFI STA, serial port to AP and WIFI STA+WIFIAPI, so as to quickly build a serial port-WIFI data transmission scheme, which is convenient for the device to use the Internet to transmit data.
2.2 signal transmission network mode

The UDP protocol is the network protocol of the transport layer, and the UDP corresponds to the application with low reliability requirements and economical transmission. The ESP8266 module supports three working modes: STA/AP/STA+AP:

- **STA mode**: ESP8266 module connects to the Internet through a router, mobile phone or computer through the InternetNow the remote control of the device.
- **AP mode**: default mode ATK_ESP8266 module as a hotspot, to achieve direct or mobile phone or computerBlock communication to achieve wireless control of the local area network.
- **STA+AP mode**: The coexistence mode of the two modes. (STA mode) can connect to the Internet through a router and control the device through the Internet; (AP mode) can also be used as a wifi hotspot, and other wifi devices are connected to the module.

The sensor transmits the data signal to the ESP8266 through the serial port communication, and then sends the data to the IoT cloud platform through the WiFi, and finally transmits it to the remote host computer.[6]

2.3 cloud status monitoring

The Internet of Things cloud platform is a service that is easy, efficient, stable, and flexible, and is more simple and efficient to manage than physical servers. The Internet of Things cloud platform can be connected to multiple upper computers for remote status monitoring.

Here, for temperature monitoring, the terminal uses an atomic cloud server, and the program code is burned into the main control board, and connected to the network by sending an AT command.[7] The real-time information of temperature and humidity can be sent to the cloud, and the temperature and humidity state of the monitored object can be viewed in real time through the Internet of Things cloud platform, realizing the real-time and convenient monitoring. The display in the cloud is shown below.
3. Testing and data processing
The test system monitors the temperature and humidity monitoring data changes by passing humid air to the sensor DHT11. The following are monitoring data and data sheets for temperature and humidity.

![Figure 3. Temperature and humidity monitoring data line chart](image)

| Time (s) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|----------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
| Temperature (°C) | 22 | 22 | 23 | 24 | 24 | 25 | 25 | 24 | 23 | 23 | 22 | 22 | 22 | 22 |
| Humidity (%RH) | 78 | 80 | 85 | 93 | 94 | 96 | 97 | 98 | 97 | 96 | 93 | 90 | 87 | 83 | 82 |

4. Conclusion
1) The method of connecting to the network through WiFi can realize data monitoring on the Internet of Things platform and eliminate the distance limitation of other wireless connection schemes.
2) Monitoring the status of the measured object is through the Internet of Things platform, with improving the stability and convenience of the monitoring status data.
3) Wireless monitoring system has a new method.

References
[1] Fan Pengfei, Jiao Yucheng, Huang Weidong, et al. Research on the Internet of Things[J]. China Soft Science, 2011(6): 57-64.
[2] Cui Li, Yan Hailing, Miao Yong, et al. Research Progress in Wireless Sensor Networks[J]. Journal of Computer Research and Development, 2005, 42(1): 163-174.
[3] Cao Zhenmin, Chen Niansheng, Ma Qiang, et al. Design of wireless control circuit based on ESP8266[J]. Industrial Control Computer, 2017(01): 71-72.
[4] Thaker, Tejas. [IEEE 2016 Symposium on Colossal Data Analysis and Networking (CDAN) - Indore, Madhya Pradesh, India (2016.3.18-2016.3.19)] 2016 Symposium on Colossal Data Analysis and Networking (CDAN) - ESP8266 based implementation of wireless sensor network with Linux based web-server[C]// 2016 Symposium on Colossal Data Analysis and Networking (CDAN). IEEE, 2016:1-5.
[5] Skraba A, Kolozvari A, Kofjac D, et al. Streaming pulse data to the cloud with bluetooth LE or NODEMCU ESP8266[C]// 2016 5th Mediterranean Conference on Embedded Computing (MECO). IEEE, 2016.
[6] Liu Xiaozhao. Design of remote data acquisition system based on ESP8266 module[J]. Electronic Test, 2017(21): 22-23+73.
[7] Huang Yujin [1,2], Yang Yue [1,2], Xue Wei [1,2], et al. AT command UDP transparent transmission design of wireless module [J]. Electronic Products World, 2018.