

Design and Implementation of Intelligent Table Lamp Based on ESP8266

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Abstract

In the modern society with the gradual popularization of smart home, the table lamp closely related to our life is still mainly traditional table lamp. In order to keep up with the pace of intelligent household appliances, this paper introduces the intelligent table lamp based on ESP8266, which organically combines the traditional table lamp with multifunctional components, including timing, timing function, weather display, wireless charging, clock, etc. At the same time can be voice control, as an intelligent assistant, become a member of the smart home.

Keywords

ESP8266; smart home; table lamp.

1. Background

Furniture intelligence is the trend of The Times, and smart home because of its easy to use is accepted by a large proportion, there is a larger market. The table lamp is closely connected with our life and is widely used.

Although the current domestic market push-button table lamp is still the main body of the table lamp market. But with the development of modern electronic technology and the improvement of people's demand, the traditional table lamp has felt the threat of product upgrading. Table lamps are not only becoming more and more functional in function, but also gradually developing in the direction of combination, decoration and interest in appearance. There is a lack of products related to smart desk lamp in the market, so the smart desk lamp based on ESP8266 introduced in this article is a step to combine intelligence with small household appliances and provide convenience for our life.

2. Technical Implementation

2.1. Application of MQTT protocol

MQTT protocol is a very portable communication protocol. Compared to protocols such as HTTP, MQTT performs well when transferring data over a network. The protocol has the characteristics of controllable service quality, small bandwidth, unpredictable data content and known device connection status. Another important feature of the protocol is its ease of implementation on the client side. It has been widely used in areas such as car networking, smart home, instant chat applications and industrial Internet.

Through the use of MQTT protocol, the effect of interconnection communication between table lamp and mobile phone can be realized stably and reliably, which increases more functions and interest of table lamp, and further development of its subsequent functions can be carried out accordingly.

2.2. ESP8266 Flash File System

Each ESP8266 has a flash drive, which is like a small hard drive. The files we upload are stored in this flash drive. In addition to storing uploaded programs, we can also store web files or system configuration files in the flash drive of the ESP8266.

The Arduino IDE's tool, ESP8266 Sketch Data Upload, uploads files to the ESP8266's flash file system. Our table lamp display background can be uploaded and modified through this tool, and users can set their own table lamp background.

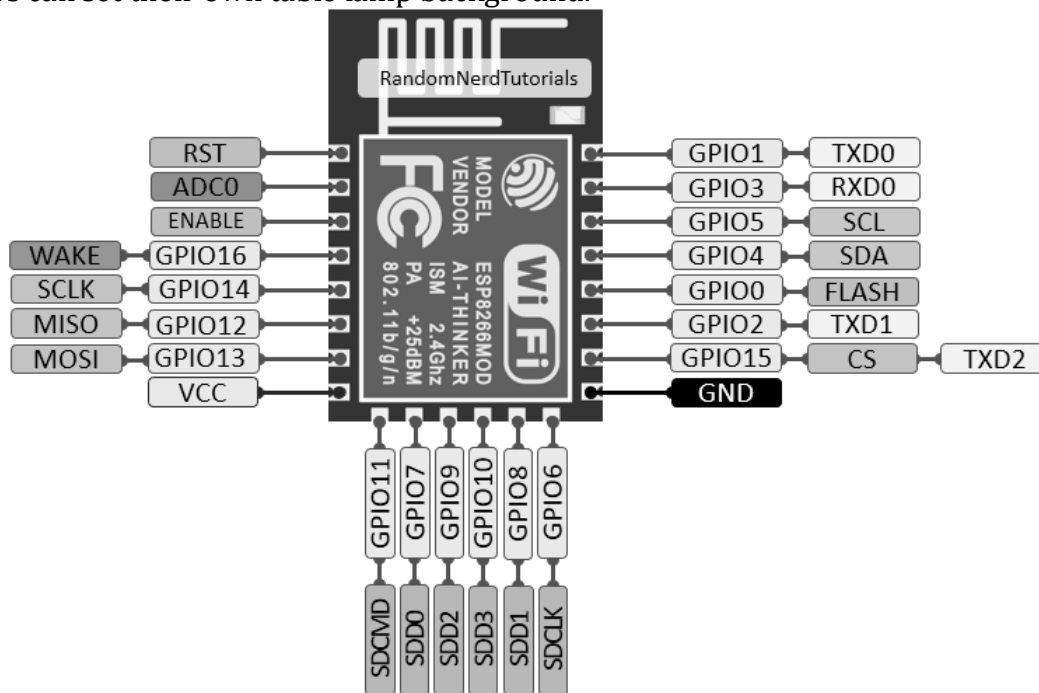


Fig 1 ESP8266 Chip

2.3. WiFi Manager network management

When working on an Internet of Things project, you often have to set up WiFi for the ESP8266, but because our lamp is for people who don't know how to program, they just use it, so we went with a third-party library called WiFi Manager for the ESP8266.

By connecting to the network generated by ESP8266, we can jump out of the WiFi connection interface. By inputting our WiFi name and password in the interface, our lamp can be connected to the WiFi network. The complicated process of entering procedures and inputting WiFi and password is saved. Our desk lamp will work normally.

2.4. HCSR04 Ultrasonic sensor corrects sitting posture

When pulses of at least 10 uS duration are applied to the trigger pin, the sensor transmits eight sound pulses at 40 KHz. This 8-pulse mode makes the device's "ultrasonic signature" unique, allowing the receiver to distinguish the emission pattern from ambient ultrasonic noise.

Eight ultrasonic pulses travel through the air, away from the transmitter. At the same time, the echo pin changes to a high level and begins to form the beginning of the echo signal. If these pulses are not reflected back, the echo signal will time out and return to a low level after 38 milliseconds. So a pulse of 38ms indicates no blocking in the sensor range.

If these pulses are reflected back, the Echo pin will lower after receiving the signal. This creates a pulse that varies in width between 150 uS and 25 mS, depending on how long it takes to receive the signal.



Fig 2 HCSR04 Ultrasonic sensor

3. System hardware design and system testing

3.1. TFT display

The high speed, large visual Angle and high contrast of TFT screen make TFT screen widely used in real life and TFT screen has the advantages of less flash screen and no eye damage. Therefore, choosing TFT screen as the channel for table lamp to interact with people not only ensures eye safety to a certain extent and avoids eye fatigue caused by staring at the screen for a long time, but also has bright colors. Greater viewing Angle for better interaction.

```

WiFi.hostByName(ntpServerName, ntpServerIP);
Serial.print(ntpServerName);
Serial.print(": ");
Serial.println(ntpServerIP);
sendNTPpacket(ntpServerIP);
uint32_t beginWait = millis();
while (millis() - beginWait < 1500) {
  int size = Udp.parsePacket();
  if (size >= NTP_PACKET_SIZE) {
    Serial.println("Receive NTP Response");
    Udp.read(packetBuffer, NTP_PACKET_SIZE); // read packet into the buffer
    unsigned long secsSince1900;
    // convert four bytes starting at location 40 to a long integer
    secsSince1900 = (unsigned long)packetBuffer[40] << 24;
    secsSince1900 |= (unsigned long)packetBuffer[41] << 16;
    secsSince1900 |= (unsigned long)packetBuffer[42] << 8;
    secsSince1900 |= (unsigned long)packetBuffer[43];
    return secsSince1900 - 2208988800UL + timeZone * SECS_PER_HOUR;
  }
}

```

Fig 3 TFT display code snippet

3.2. Wechat terminal and mobile App testing

The platform can associate wechat small program, conduct wechat interface test, bind user information, enter corresponding commands as required by the platform, and pass the test. After logging in the system, the sensor data can be viewed and the sensor remote control can be realized. After you install the App on an Android phone, bind the corresponding information, log in, open the network hotspot configured on the phone, and add devices and ports. The Wi-Fi module of ESP8266 uploads data to the server. The collected data is displayed

in numbers or line charts. You can view the connection status of the corresponding device on the mobile phone.

4. Conclusion

This paper proposes the design of intelligent desk lamp based on ESP8266, which sends data information to and receives data from the platform through ESP8266WIFI module. The system uses WIFI wireless communication technology to replace the single function of the traditional table lamp and solve a number of small functional needs of people. In the future, more powerful WIFI modules will be explored to realize one-to-many data processing.

Acknowledgments

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