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Environmental Monitoring and Data Analysis Detection System based on OBLOG Wireless Communication Module

Jiale Li, Mingming Hu

Ningbo ladder Education Technology Co., Ltd，315000, China

Abstract

This system is based on OBLOG IoT platform, which can monitor the temperature and humidity, formaldehyde, and PM2.5 concentration of the park through software and hardware. A more functional indoor air quality detection system is designed. The sensor collects a number of parameters such as indoor temperature and humidity, formaldehyde and PM2.5 in real time, and the data it collects are sent to the cloud server through the OBLOQ wireless module. Users can access the cloud server through the cell phone APP to obtain the data and realize remote detection of indoor air quality.

Keywords

OBLOG, environmental monitoring, Internet of things, APP.

1. Introduction

The popularization and application of the Internet has triggered a new information revolution and industrial revolution. And the era of Internet of Things (IoT) has arrived, with applications such as smart home, smart transportation, and smart city, etc. springing up. PM2.5 monitoring equipment has been installed in most cities, and we can learn related information in real time through related websites and applications. But those monitoring points are set up between cities, and the regional scope is relatively large. So we can't exactly analyze the pollution index of a specific place, especially in places with large population density such as schools and factories.

2. Design content

This project mainly realizes indoor environmental indicators monitoring, including temperature, humidity, PM2.5, formaldehyde, and carbon dioxide, etc, outdoor environmental indicators monitoring, including wind speed, wind direction, noise, temperature and humidity, PM2.5/10, formaldehyde, and benzene gas, etc. The display functions include LED display, WEB terminal and mobile terminal display data collection and analysis, and sensor layout point diagram, etc. The information push function includes pushing to multiple users from remote APP and mobile terminal and web terminal, AND indoor real-time data + outdoor environmental parameters + public outdoor air quality function, etc..

3. Architecture design

The framework of this system is shown in Figure 1, which mainly includes the following aspects.

(1) The collection layer realizes data collection of temperature, humidity, PM2.5 concentration, PM10 concentration and formaldehyde concentration in each area of the room. The collected data is analyzed and processed, and the processed data is sent to Easy IOT via wireless module OBLOQ using MQTT protocol. In that way, the wireless transmission from the collection layer to the convergence layer is realized.

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(2) Convergence layer: It is responsible for summarizing the data uploaded by each terminal detection node in the collection layer, analyzing and judging the terminal data, and connecting the correctly processed data to the user APP through HTTP protocol. Thus, the data transmission between the convergence layer and the transmission layer is realized.

(3) The server in the application layer analyzes and stores the data uploaded by the convergence layer. The APP is used to remotely interact with the server through HTTP network protocol, and the user can remotely detect the indoor ambient air quality in real time through the APP.

(4) OBLOQ is a piece of middleware that can connect to the iot website and the main control board communication. In the wifi environment, the main control board can be connected to the Internet through the OBLOQ module to send device data or receive remote control commands on time.

(5) Easy IOT is an IoT platform where IoT connects physical devices embedded with electronic devices, software, sensors and actuators to the cloud and to each other. Devices communicate through different protocols, and many protocols such as MQTT can support intermittent connectivity and reduce network bandwidth requirements.

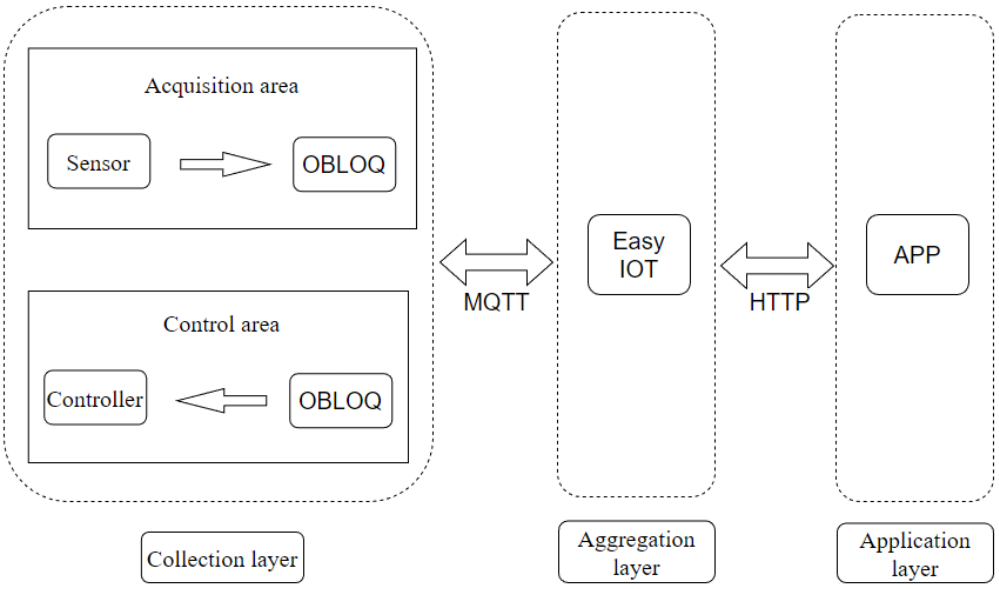

Figure 1: System framework

(6)Communication Protocol

OBLOQ supports MQTT and HTTP protocols to connect the Internet of Things.

A.MQTT protocol:

Generate OBLOQ object Obloq olq (&softSerial, "wifiSsid", "WifiPwd", "SJ iotId", "iotPwd");Use olq publish("DFRobot-guest", String(XXXXX)); Communicate.

B.HTTP protocol

The HTTP protocol does not need to use iot_ id, iot_ Pwd, Obloq olq(&softSerial,"DFRobot-guest"," dfrobot@2017 ");

After the access is successful, the httpMsgHandle function can print the code (system message) and message (specific message) returned by the server through the serial port.If Obloq uses HTTP POST to send data, the data sent must be a Json string, and the server receiving the data must also be able to accept Json type data.

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GET request mode: "|3|1|url|\r"
Parameters:
Url Set the url link of the Get request
Return value:
"|3|code|data|\r"
Parameters:
Code Success or error code returned by the http request,
Success: code=200
Failed to get data: code=- 1
Error in http request field: code=1
Data The data returned by the http request
Arduino example:
softSerial.print("|3|1| http://192.168.9.122:8080/input?id=1&val=22 |\r");

4. System Implementation

(1) Environment indication interface: This interface shows the current data values of all sensors in real time and can determine whether a warning should be given according to the threshold value of each sensor.

(2) Real-time data graph interface: This interface shows the data values of each sensor by means of real-time graphs.

(3) Sensor threshold settings: the maximum and minimum values of each sensor can be set by the client, and the system will determine whether to enter the alarm state based on these thresholds.

(4) Historical data display interface: The client side can store the read sensor data to the database. And the user can read the historical data from the database by selecting the sensor type and time period, and then display it in graphs.

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