摘要

随着人类社会的发展，越来越多的工作的办公场地为室内，因此，室内空气质量是关乎着人类身体健康的重要因素。尤其像厂房、医院、办公室、教室等空间相对狭窄且透气性不好的场所，关注室内空气质量更加重要。空气质量的基本要素包括甲醛、二氧化碳、湿度、PM2.5等。本空气质量监测系统主要通过高精度颗粒传感器采集室内PM2.5、PM10浓度数据，通过串口将采集到的数据上传到服务器，服务器对数据进行处理最终显示在客户端，用户根据实时空气质量指数开关空气净化器。

本次实验利用高精度颗粒传感器采集空气质量指数，通过串口将采集的数据发送到服务器，监测结果以Web形式呈现给用户。该系统可以实现全自动监控，随时随地为用户提供空气质量信息服务，实现了对空气质量数据的采集与监测、管理及分析。

整个系统的硬件和软件实现过程，硬件设计主要集中在子节点传感器、串口通信模块和arduino平台的设计；软件设计主要包括主节点数据处理系统的设计、Web服务器的设计、Web前端页面的设计，子节点数据传输系统的设计。

该系统的实现对各个工厂、家庭、办公室、医院等的室内空气监管具有指导意义。

系统的创新点：

1. 本系统将传感器网络与环境质量监测终端相结合，即可以实现对空气颗粒物信息的采集与传输，方便安装与使用。
2. 用户可以自由选择时间查询对应时间的空气质量指数，确认自己是否呼吸到新鲜干净的空气。
3. 查询指定时间段的空气质量指数以折线图的形式呈现给用户，使用户能够掌握室内空气质量指数的走势，从来控制空气净化器的开关状态。

关键字：室内空气质量、身体健康、PM2.5、PM10、实时空气质量指数

**Abstract**

With the development of human society,more and more work in the office space for the interior.Therefore, the indoor air quality is an important factor related to human health.Especially in the plant, hospitals, offices, classrooms and other space is relatively narrow and poor ventilation of the place, concerned about the indoor air quality is more important.The basic elements of air quality include formaldehyde, carbon dioxide, humidity, PM2.5 and so on.The air quality monitoring system mainly through the high-precision particle sensor to collect indoor PM2.5, PM10 concentration data, through the serial port will be collected to the data uploaded to the server,and the server processes the data and finally displays it on the client,with this,user can switche the air purifier according to the real-time air quality index.

This experiment uses high-precision particle sensor to collect air quality index, through the serial port will be collected data sent to the server,the user can view the Real-time air quality through the Web.The system can be fully automated monitoring,evaluate the current air quality,Anytime, anywhere to provide users with air quality information services, to achieve the air quality data collection and monitoring, management and analysis.

The hardware and software implementation of the whole system, the Hardware design mainly concentrated in the sub-node sensor, serial communication module and arduino platform design. The software design mainly includes the design of the master node data processing system, the design of the Web server, the web front page Design, sub-node data transmission system design.

The realization of the system for various factories, families, offices, hospitals and other indoor air supervision has a guiding significance.

System Innovation:

(1) The system will be wireless sensor network and environmental quality monitoring terminal combination, which can achieve the pm2.5 information collection and transmission, easy to install and use.

(2) the user can freely choose the time to check the corresponding time of the air quality index, to confirm whether they are fresh and clean air breathing.

(3) query the specified time period of the air quality index in the form of a line graph presented to the user, so that users can grasp the trend of indoor air quality index, and never control the air purifier switch state.

Keywords：Real-time air quality index；Arduino；PM2.5；PM10; Indoor air quality