US Patent & Trademark Office
Patent Public Search | Text View

United States Patent Application Publication	20250264243
Kind Code	A1
Publication Date	August 21, 2025
Inventor(s)	Mou; Hao-Jan et al.

INDOOR AIR CLEANING SYSTEM

Abstract

An indoor air cleaning system includes a gas detection module, an air cleaning device and a central control device. The gas detection module includes a microcontroller and a central control communication interface component. The microcontroller performs a computation and outputs regulation signals based on air pollution data. The air cleaning device includes a fan, a filter element and a driving control component. The central control device provides an operation instruction to the gas detection module for guiding air pollution to pass through the filter element, thereby making an air pollution state of an indoor field specified by accumulated numbers of 1 nm-2.5 μm suspended particulates detected by the gas detection module within 24 hours to meet a cleanliness of ZAPClean room 1-12.

Inventors: **Mou; Hao-Jan (Hsinchu, TW), Wu; Chin-Chuan (Hsinchu, TW), Huang; Chi-Feng (Hsinchu, TW)**

Applicant: **Microjet Technology Co., Ltd.** (Hsinchu, TW)

Family ID: **1000007887437**

Assignee: **Microjet Technology Co., Ltd. (Hsinchu, TW)**

Appl. No.: **18/664671**

Filed: **May 15, 2024**

Foreign Application Priority Data

TW	113105859	Feb. 19, 2024
TW	113112219	Mar. 29, 2024

Publication Classification

Int. Cl.: **F24F11/77** (20180101); **F24F8/108** (20210101); **F24F110/66** (20180101); **F24F110/70** (20180101); **F24F110/72** (20180101); **F24F110/74** (20180101)

U.S. Cl.:

CPC **F24F11/77** (20180101); **F24F8/108** (20210101); F24F2110/66 (20180101); F24F2110/70 (20180101); F24F2110/72 (20180101); F24F2110/74 (20180101)

Background/Summary

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priorities to Taiwan Patent Application No. 113112219 filed on Mar. 29, 2024 and Taiwan Patent Application No. 113105859 filed on Feb. 19, 2024. The entire contents of the above-mentioned patent applications are incorporated herein by reference for all purposes.

FIELD OF THE INVENTION

[0002] The present disclosure relates to an indoor air cleaning system, and more particularly to an indoor air cleaning system having air cleaning devices cooperated with gas detection modules for air pollution detection, so that an air pollution state of an indoor field specified by accumulated numbers of 1 nm-2.5 μm suspended particulates detected by a plurality of gas detection modules within 24 hours can meet a cleanliness of ZAPClean room 1-12.

BACKGROUND OF THE INVENTION

[0003] Suspended particles are solid particles or droplets contained in the air. Due to their extremely fine size, the suspended particles may enter the lungs of human body through the nasal hairs in the nasal cavity easily, causing inflammation in the lungs, asthma or cardiovascular disease. If other pollutant compounds are attached to the suspended particles, it will further increase the harm to the respiratory system. In recent years, the problem of air pollution is getting worse. In particular, the concentration of particle matters (e.g., PM2.5) is often too high. Therefore, the monitoring to the concentration of the gas suspended particles is taken more and more seriously. However, the gas flows unstably due to variable wind direction and air volume, and the general gas-quality monitoring station is located in a fixed place. Under this circumstance, it is impossible for people to check the concentration of suspended particles in current environment.

[0004] Furthermore, in recent years, modern people are placing increasing importance on the quality of the air in their surroundings. For example, carbon monoxide, carbon dioxide, volatile organic compounds (VOC), PM2.5, nitric oxide, sulfur monoxide and even the suspended particles contained in the air are exposed in the environment to affect the human health, and even endanger the life seriously. Therefore, the quality of environmental air has attracted the attention in various countries. At present, how to detect the air quality and avoid the harm is a crucial issue that urgently needs to be solved.

[0005] In order to confirm the quality of the air, it is feasible to use a gas sensor to detect the air in the surrounding environment. If the detection information can be provided in real time to warn people in the environment, it is helpful of avoiding the harm and facilitates people to escape the hazard immediately, thereby preventing the hazardous gas exposed in the environment from affecting the human health and causing the harm. Therefore, it is considered a valuable application to use a gas sensor to detect the air in the surrounding environment.

[0006] In addition, it is not easy to control the indoor air quality. Besides the outdoor air quality, indoor air-conditioning conditions and pollution sources are the major factors affecting the indoor air quality. It is necessary to intelligently and rapidly detect indoor air pollution sources in various indoor fields, effectively remove the indoor air pollution to form a clean and safe breathing gas state, and monitor the indoor air quality in real time anytime, anywhere. Certainly, if the concentration of the suspended particles in the indoor field is strictly controlled according to the "clean room" standard, it allows of avoiding the introduction, generation and retention of suspended particles, and the temperature and humidity in the indoor field can be controlled within the required range. That is to say, through classifying the indoor field by the number of suspended particles in the air, the indoor field can meet the clean room requirements for safe breathing.

[0007] Currently, the air pollution detection of the indoor air cleaning system is as followed. The gas detector detects and outputs air pollution information, the cloud computing server receives the air pollution information of outdoor field and indoor field, stores the air pollution information to form a database of air pollution data, performs an intelligence computing for comparison based on the air pollution data, and intelligently selects and issues a control command to enable the fan of the air cleaning device to generate a directional circulation airflow for rapidly guiding the air pollution to pass through the filter element multiple times for filtration, thereby reaching a gas state of the indoor field to a cleanroom class by a cleanliness specification based on the number of suspended particles.

[0008] Therefore, it is an issue of concern developed in the present disclosure to provide an indoor air cleaning system which monitors the indoor air quality and filters and cleans the indoor air in real time through a coordinated regulation between plural air cleaning devices and a control device, so as to make the air pollution state of the indoor field which has a space specified by accumulated numbers of 1 nm-2.5 μm suspended particulates detected by plural gas detection modules within 24 hours to meet a cleanliness of ZAPClean room 1-12.

SUMMARY OF THE INVENTION

[0009] The major object of the present disclosure is to provide an indoor air cleaning system including a plurality of gas detection modules, a plurality of air cleaning devices and at least one central control device. Through disposing the gas detection module in each of the air cleaning devices in electric connection, the air pollution is detected and the operation is regulated. Moreover, the connection of the central control device to the gas detection modules is achieved through one of the wired communication and the wireless communication selected under the handshake protocol for providing the operation instruction to the gas detection modules to control the enablement, air volume and noise level of the fans of the plurality of air cleaning devices, so as to guide the air pollution to pass through the filter elements of the plurality of air cleaning devices for filtration, thereby making the air pollution state of the indoor field specified by accumulated numbers of 1 nm-2.5 μm suspended particulates detected by the plurality of gas detection modules within 24 hours to meet a cleanliness of ZAPClean room 1-12.

[0010] In a broader aspect of the present disclosure, an indoor air cleaning system is provided. The system includes a plurality of gas detection modules for detecting an air pollution and generating air pollution data so as to compute and output a plurality of regulation signals; a plurality of air cleaning devices disposed in an indoor field, wherein each of the plurality of air cleaning device includes a fan, a filter element and a driving control component and has at least one of the plurality of gas detection modules disposed therein and electrically connected to the driving control component thereof for controlling an enablement, an air volume and a noise level of the fan thereof, so as to guide the air pollution to pass through the filter element thereof for filtration; and at least one central control device connected with the plurality of gas detection modules through wired communication or wireless communication under a handshake protocol for providing an operation instruction to the plurality of gas detection modules to control operations of the fans of the plurality of air cleaning devices and receiving the air pollution data detected by the plurality of gas detection modules for real time display, wherein an air pollution state of the indoor field specified by accumulated numbers of 1 nm-2.5 μm suspended particulates detected by the plurality of gas detection modules within 24 hours meets a cleanliness of ZAPClean room 1-12.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The above contents of the present disclosure will become more readily apparent to those ordinarily skilled in the art after reviewing the following detailed description and accompanying drawings, in which:

[0012] FIG. **1**A is a schematic view illustrating an indoor air cleaning system implemented in an indoor field according to an embodiment of the present disclosure;

[0013] FIG. **1**B is another schematic view illustrating the indoor air cleaning system implemented in an indoor field according to an embodiment of the present disclosure;

[0014] FIG. **1**C is a schematic view illustrating the indoor air cleaning system implemented in a kitchen unit in an indoor field according to an embodiment of the present disclosure;

[0015] FIG. **2**A is a block diagram showing communication relationships of gas detection modules in the air cleaning system via wired communication or wireless communication according to an embodiment of the present disclosure;

[0016] FIG. **2**B is a block diagram showing the configuration of the gas detection module in the air cleaning system according to an embodiment of the present disclosure;

[0017] FIG. **3**A is a schematic view illustrating the combination of a fan and a filter element of an air cleaning device according to the embodiment of the present disclosure;

[0018] FIG. **3**B is a schematic view illustrating the combination of filter elements of the air cleaning device according to an embodiment of the present disclosure;

[0019] FIG. **3**C is a block diagram showing the configuration of the air cleaning device according to an embodiment of the present disclosure;

[0020] FIG. **3**D is a block diagram showing the configuration of an ultraviolet lamp assembly in the air cleaning device according to an embodiment of the present disclosure;

[0021] FIG. **4**A is a schematic perspective view illustrating the gas detection module which is disposed in the outdoor field or the indoor file for detection according to an embodiment of the present disclosure;

[0022] FIG. **4**B is a schematic perspective view illustrating the gas detection module which is disposed in the outdoor field or the indoor file for detection according to an embodiment of the present disclosure from another angle;

[0023] FIG. **4**C is a schematic perspective view illustrating a gas detection module according to an embodiment of the present disclosure;

[0024] FIG. **5** is a block diagram showing the architecture of a cloud computing server according to an embodiment of the present disclosure; and

[0025] FIG. **6** is a table showing specifications of air pollution data based on the cleanliness classification of an indoor field specified by accumulated numbers of 1 nm-2.5 μm suspended particulates detected by a plurality of gas detection modules within 24 hours.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0026] The present disclosure will now be described more specifically with reference to the following embodiments. It is to be noted that the following descriptions of preferred embodiments of this disclosure are presented herein for purpose of illustration and description only. It is not intended to be exhaustive or to be limited to the precise form disclosed.

[0027] Please refer to FIG. **1**A, FIG. **1**B and FIG. **1**C which are schematic views illustrating an indoor air cleaning system of the present disclosure being used in an indoor field A. The present disclosure provides an indoor air cleaning system which includes a plurality of gas detection modules **1**, a plurality of air cleaning devices **2**, a central control device **3** and a cloud computing server **4**.

[0028] Please refer to FIG. **2**B. The gas detection module **1** mentioned above includes at least one power conversion component **11**, at least one sensing element assembly **12**, at least one microcontroller (MCU) **13**, at least one wireless communication component (WI-FI) **14**, and at least one central control communication interface component **15**.

[0029] The power conversion component **11** mentioned above receives an AC (alternating current) power and output a required DC (direct current) power for providing to the sensing element assembly **12**, the microcontroller **13**, the wireless communication component **14** and the central control communication interface component **15**. In the embodiment, the power conversion component **11** converts the inputted AC power into 5V and 3.3.V required DC voltages, wherein 5V DC required voltage is provided to the sensing element assembly **12**, the microcontroller **13** and the central control communication interface component **15**, and 3.3V required DC voltage is provided to the sensing element assembly **12** and the wireless communication component **14**, but not limited thereto.

[0030] The sensing element assembly **12** mentioned above includes a sensing element disposed in an indoor field A or an outdoor field B for detecting the air pollution and outputting air pollution data to the microcontroller **13**, and the microcontroller **13** performs computation and outputs plural regulation signals. Notably, in the embodiment, the air pollution includes at least one selected from the group consisting of particulate matter, ozone, carbon monoxide, carbon dioxide, sulfur dioxide, nitrogen dioxide, acetaldehyde, acetamide, acetonitrile, acetophenone, 2-acetamidofluorene, acrolein, acrylamide, acrylic acid, acrylonitrile, allyl chloride, 4-aminobiphenyl, aniline, o-anisidine, asbestos, benzene, benzidine, trichlorotoluene, benzyl chloride, biphenyl, bis(2-ethylhexyl)phthalate (DEHP), bis(chloromethyl) ether, tribromomethane, 1-bromopropane, 1,3-butadiene, calcium cyanamide, caprolactam, captan, carbaryl, carbon disulfide, carbon tetrachloride, carbonyl sulfide, o-benzenediol, chloramben, chlordane, chlorine, chloroacetic acid, 2-chloroacetophenone, chlorobenzene, chlorobezilate, trichloromethane, chloromethyl methyl ether, chloroprene, cresol/methanesulfonic acid (isomers and mixtures), o-cresol, m-cresol, p-cresol, cumene, 2,4-dichlorophenoxyacetic acid and salts and esters thereof, dichlorodiphenyldichloroethylene (DDE), diazomethane, dibenzofuran, 1,2-dibromo-3-chloropropane, dibutyl phthalate, 1,4-dichlorobenzene, 3,3-dichlorobenzidine, dichloroethyl ether (bis(2-chloroethyl) ether), 1,3-dichloropropene, dichlorvos, diethanolamine, N,N-dimethylaniline, diethyl sulfate, 3,3-dimethoxybenzidine, dimethylaminoazobenzene, 3,3′-dimethylbenzidine, dimethylcarbamyl chloride, dimethylformamide, 1,1-dimethylhydrazine, dimethyl phthalate, dimethyl sulfate, 4,6-dinitro-o-cresol and salts thereof, 2,4-dinitrophenol, 2,4-dinitrotoluene, 1,4-dioxane (1,4-ethylene dioxide), 1,2-diphenylhydrazine, epichlorohydrin (1-chloro-2,3-epoxypropane), 1,2-epoxybutane, ethyl acrylate, ethylbenzene, ethyl urethane (ethyl carbamate), chloroethane, ethylene dibromide, ethylene dichloride (1,2-deichloroethane), ethylene glycol, ethyleneimine (aziridine), ethylene oxide, ethylene thiourea, ethylene dichloride (1,1-dichloroethane), formaldehyde, heptachlor, hexachlorobenzene, hexachlorobutadiene, hexachlorocyclopentadiene, hexachloroethane, 1,6-hexamethylene diisocyanate, hexamethylphosphonamide, hexane, hydrazine, hydrochloric acid, hydrogen fluoride (hydrofluoric acid), hydrogen sulfide, hydroquinone, isophorone, lindane (all isomers), maleic anhydride, methanol, methoxychlor, methyl bromide (bromomethane), methyl chloride (chloromethane), methyl chloroform (1,1,1-trichloroethane), methyl ethyl ketone (2-butanone), methyl hydrazine, methyl iodide (iodomethane), methyl isobutyl ketone (cyclohexanone), methyl isocyanate, methyl methacrylate, methyl tert-butyl ether, 4,4-methylenebis(2-chloroaniline), methylene chloride, methylene diphenyl diisocyanate (MDI), 4,4′-Methylenedianiline, naphthalene, nitrobenzene, 4-Nitrobiphenyl, 4-nitrophenol, 2-nitropropane, N-nitroso-N-methylurea, N-nitrosodimethylamine, N-nitrosomorpholine, Parathion, pentachloronitrobenzene (pentabenzene), pentachlorophenol, phenol, p-phenylenediamine, phosgene, phosphine, phosphorus, phthalic anhydride, polychlorinated biphenyls (Aroclors), 1,3-propane sultone, β-propiolactone, propionaldehyde, propoxur (Baigon), dichloropropane (1,2-dichloropropane), propylene oxide, 1,2-propyleneimine (2-methylaziridine), quinoline, quinone, styrene, styrene oxide, 2,3,7,8-tetrachlorodibenzo-p-dioxin, 1,1,2,2-tetrachloroethane, tetrachloroethylene (perchlorethylene), titanium tetrachloride, toluene, 2,4-toluylenediamine, 2,4-toluene diisocyanate, o-toluidine, toxaphene (chlorinated camphene), 1,2,4-trichlorobenzene, 1,1,2-trichloroethane, trichloroethylene, 2,4,5-trichlorophenol, 2,4,6-trichlorophenol, triethylamine, trifluralin, 2,2,4-trimethylpentane, vinyl acetate, vinyl bromide, vinyl chloride, vinylidene chloride (1,1-dichloroethylene), xylene, o-xylene, m-xylene, p-xylene, antimony compounds, arsenic compounds (inorganic, including arsine), beryllium compounds, cadmium compounds, chromium compounds, cobalt compounds, coke oven emissions, cyanide, glycol ethers, lead compounds, manganese compounds, mercury compounds, fine mineral fibers, nickel compounds, polycyclic organic compounds, radionuclide (including radon), selenium compounds, bacteria, fungi, virus, and a combination thereof.

[0031] The sensing element assembly **12** of the gas detection module **1** not only can detect the suspended particulates in the gas, but also can detect the properties of the introduced gas, and accordingly, the sensing element assembly **12** may include a particle sensing element **12***a*, a temperature and humidity sensing element **12***b* and a gas sensing element **12***c*. Moreover, the sensing element assembly **12** may further include other sensing elements, such as a bacteria sensing element **12***d*, a fungi sensing element **12***e* and a virus sensing element **12***f*, for detecting the introduced air pollution. Notably, in the embodiment, the sensing element assembly **12** includes the particle sensing element **12***a* for detecting air pollution data of at least one contained in the air selected from the group consisting of suspended particulate matters (PM1, PM2.5, PM10), acetamide, acetonitrile, acetophenone, 2-acetamidofluorene, acrolein, acrylamide, acrylic acid, acrylonitrile, allyl chloride, 4-aminobiphenyl, aniline, o-anisidine, asbestos, benzidine, biphenyl, bis(2-ethylhexyl)phthalate (DEHP), bis(chloromethyl) ether, 1,3-butadiene, calcium cyanamide, caprolactam, captan, carbaryl, o-benzenediol, chloramben, chlordane, chloroacetic acid, 2-chloroacetophenone, chlorobezilate, chloromethyl methyl ether, cresol/methanesulfonic acid (isomers and mixtures), o-cresol, m-cresol, p-cresol, cumene, 2,4-dichlorophenoxyacetic acid and salts and esters thereof, dichlorodiphenyldichloroethylene (DDE), dibenzofuran, dibutyl phthalate, 1,4-dichlorobenzene, 3,3-dichlorobenzidine, dichloroethyl ether (bis(2-chloroethyl) ether), 1,3-dichloropropene, dichlorvos, diethanolamine, N,N-dimethylaniline, diethyl sulfate, 3,3-dimethoxybenzidine, dimethylaminoazobenzene, 3,3′-dimethylbenzidine, dimethylcarbamyl chloride, dimethylformamide, 1,1-dimethylhydrazine, dimethyl phthalate, dimethyl sulfate, 4,6-dinitro-o-cresol and salts thereof, 2,4-dinitrophenol, 2,4-dinitrotoluene, 1,4-dioxane (1,4-ethylene dioxide), 1,2-diphenylhydrazine, epichlorohydrin (1-chloro-2,3-epoxypropane), 1,2-epoxybutane, ethyl acrylate, ethyl urethane (ethyl carbamate), ethylene glycol, ethyleneimine (aziridine), ethylene oxide, ethylene thiourea, hexachlorobutadiene, hexachlorocyclopentadiene, 1,6-hexamethylene diisocyanate, hexamethylphosphonamide, hydrazine, hydroquinone, isophorone, lindane (all isomers), maleic anhydride, methyl hydrazine, methyl isobutyl ketone (cyclohexanone), methyl isocyanate, methyl methacrylate, methyl tert-butyl ether, 4,4-methylenebis(2-chloroaniline), methylene diphenyl diisocyanate (MDI), 4,4′-methylenedianiline, naphthalene, nitrobenzene, 4-nitrobiphenyl, 4-nitrophenol, 2-nitropropane, N-nitroso-N-methylurea, N-nitrosodimethylamine, N-nitrosomorpholine, Parathion, pentachloronitrobenzene (pentabenzene), pentachlorophenol, phenol, p-phenylenediamine, phosphine, phosphorus, phthalic anhydride, polychlorinated biphenyls (Aroclors), 1,3-propane sultone, β-propiolactone, propoxur (Baigon), propylene oxide, 1,2-propyleneimine (2-methylaziridine), quinoline, quinone, styrene, styrene oxide, 2,3,7,8-tetrachlorodibenzo-p-dioxin, titanium tetrachloride, 2,4-toluylenediamine, 2,4-toluene diisocyanate, o-toluidine, toxaphene (chlorinated camphene), 2,4,5-trichlorophenol, 2,4,6-trichlorophenol, triethylamine, trifluralin, 2,2,4-trimethylpentane, vinyl acetate, vinyl bromide, vinyl chloride, vinylidene chloride (1,1-dichloroethylene), antimony compounds, arsenic compounds (inorganic, including arsine), beryllium compounds, cadmium compounds, chromium compounds, cobalt compounds, coke oven emissions, cyanide, lead compounds, manganese compounds, mercury compounds, fine mineral fibers, nickel compounds, polycyclic organic compounds, radionuclide and selenium compounds. In another embodiment, the sensing element assembly **12** includes the temperature and humidity sensing element **12***b* for detecting air pollution data of temperature and humidity of the air. In another embodiment, the sensing element assembly **12** includes the gas sensing element **12***c* for detecting air pollution data of gas molecules in the air, and the gas molecules, for example, include at least one selected from the group consisting of ozone, carbon monoxide, carbon dioxide, sulfur dioxide, acetaldehyde, benzene, trichlorotoluene, benzyl chloride, tribromomethane, 1-bromopropane, carbon disulfide, carbon tetrachloride, carbonyl sulfide, chlorine, chlorobenzene, trichloromethane, chloroprene, diazomethane, 1,2-dibromo-3-chloropropane, ethylbenzene, chloroethane, ethylene dibromide, ethylene dichloride (1,2-deichloroethane), ethylene dichloride (1,1-dichloroethane), formaldehyde, heptachlor, hexachlorobenzene, hexachloroethane, hexane, hydrochloric acid, hydrogen fluoride (hydrofluoric acid), hydrogen sulfide, methanol, methoxychlor, methyl bromide (bromomethane), methyl chloride (chloromethane), methyl chloroform (1,1,1-trichloroethane), methyl ethyl ketone (2-butanone), methyl iodide (iodomethane), methylene chloride, phosgene, propionaldehyde, dichloropropane (1,2-dichloropropane), 1,1,2,2-tetrachloroethane, tetrachloroethylene (perchlorethylene), toluene, 1,2,4-trichlorobenzene, 1,1,2-trichloroethane, trichloroethylene, xylene, o-xylene, m-xylene, p-xylene, glycol ethers, and radon. In another embodiment, the sensing element assembly **12** includes the bacteria sensing element **12***d* for detecting air pollution data of bacteria contained in the air. In another embodiment, the sensing element assembly **12** includes the fungi sensing element **12***e* for detecting air pollution data of fungi contained in the air. In another embodiment, the sensing element assembly **12** includes the virus sensing element **12***f* for detecting air pollution data of virus contained in the air. In other embodiments, the sensing element assembly **12** includes other sensing elements without limitation.

[0032] The particle sensing element **12***a* mentioned above is disposed in an indoor field A or an outdoor field B and configured to detect particle sizes (PM1, PM2.5, PM 10) and concentrations of suspended particulates contained in the air for outputting air pollution data thereof. When the microcontroller **13** receives the air pollution data of suspended particulates which exceeds a safety value, plural regulation signals are outputted. For example, the safety value of suspended particulate matter 2.5 (PM2.5) is a concentration less than 15 μg/m.sup.3. The temperature and humidity sensing element **12***b* is configured to detect temperature and humidity of the air in the indoor field A and output air pollution data of temperature and humidity. When the microcontroller **13** receives the air pollution data of temperature and humidity which exceeds a safety value, plural regulation signals are outputted. For example, the safety value of temperature in the indoor field A is to be maintained at 25° C.±3° C., and the safety value of humidity in the indoor field A is within a range of 50%±10%. The gas sensing element **12***c* is configured to detect a concentration of carbon dioxide (CO.sub.2) contained in the air and output air pollution data of carbon dioxide. When the microcontroller **13** receives the air pollution data of carbon dioxide (CO.sub.2) which exceeds a safety value, plural regulation signals are outputted. For example, the safety value of carbon dioxide (CO.sub.2) in the indoor field A is to be maintained below 800 PPM.

[0033] The microcontroller **13** receives and computes the air pollution data outputted by the sensing element assembly **12** for outputting plural regulation signals, wherein the air pollution data from the sensing element assembly **12** is transmitted to the microcontroller **13** via the electrical circuit, such as, IIC (Inter-Integrated Circuit) communication protocol. The regulation signals outputted by the microcontroller **13** include a UART (Universal Asynchronous Receiver/Transmitter) signal and a GPIO (General-Purpose Input/Output) signal. The UART signal is transmitted to the air cleaning device **2**, the wireless communication component **14** and the central control communication interface component **15** via the electrical circuit, and the GPIO signal is transmitted to the air cleaning device **12** via the electrical circuit. Notably, as shown in FIG. **2**A and FIG. **2**B, the central control communication interface component **15** is communicated with the central control device **3** by connecting to a communication control cable. Preferably but not exclusively, a wired communication (as shown by solid lines in FIG. **2**A) under RS485 communication protocol is used. Please further refer to FIG. **4**A and FIG. **4**B. The gas detection module **1** can be configured with an external power terminal, and the external power terminal can be directly inserted into the power interface in the indoor field A or the outdoor field B (as the gas detection module represented by 1 in FIG. **1**A and FIG. **1**B) for enabling the detection of air pollution. Alternatively, as shown in FIG. **4**C, the gas detection module **1** also can be configured without external power supply terminal for being directly disposed in the air cleaning device **2** in electric connection (as the gas detection module **1** shown in FIG. **2**A).

[0034] Moreover, please refer to FIG. **3**A and FIG. **3**C. The air cleaning device **2** mentioned above is disposed in the indoor field A and includes a fan **21**, a filter element **22** and a driving control component **23**, and further, the gas detection module **1** is directly disposed the air cleaning device **2** in electric connection. The gas detection module **1** detects air pollution and outputs the driving power and the regulation signals, wherein the gas detection module **1** is electrically connected to the fan **21** and the driving control component **23** (as shown in FIG. **3**C). Please refer to FIG. **2**B and FIG. **3**C, the air cleaning device **2** further includes a relay **24** and a communication interface device **25**, wherein the relay **24** outputs an AC power to the driving control component **23** for power regulation based on the AC power inputted from the power conversion component **11** and the regulation signal (the GPIO (General-Purpose Input/Output) signal) outputted by the microcontroller **13** cooperatively. The communication interface device **25** enables and controls the win speed of the fan **21** of the air cleaning device **2** based on the 5V required DC voltage inputted from the power conversion component **11** and the regulation signal (the UART (Universal Asynchronous Receiver/Transmitter) signal) outputted by the microcontroller **13** cooperatively through communicating with the driving control component **23** via a communication control cable, so as to guide the air pollution to pass through the filter element **22** for filtration. Notably, in the embodiment, the air cleaning device **2** is communicated via a communication control cable under RS485 communication protocol. Notably, in the embodiment, the system is configured to include a plurality of air cleaning devices **2**, and each air cleaning device **2** includes an address encoder (not shown) for connecting with pins for outputting the regulation signal (the GPIO signal), so the plurality of air cleaning devices **2** can be connected in series for regulation.

[0035] Please refer to FIG. **2**B. The central control device **3** is connected to the central control communication interface components **15** of the gas detection modules **1** via the communication control cable, and further, the central control device **3** provides an operation instruction to the microcontroller **13** via a communication protocol for controlling operations of the plurality of air cleaning devices **2** and receives the air pollution data detected by the gas detection modules **1** for real time display.

[0036] Please refer to FIG. **2**B and FIG. **3**C. The cloud computing server **4** mentioned above receives the air pollution data detected and outputted by the gas detection modules **1** in the plurality of air cleaning devices **2** through wireless communication via a router **5**, and stores the air pollution data to form a database of air pollution data. The cloud computing server **4** performs an intelligence computing for comparison based on the air pollution data, and intelligently selects and issues a control command to the gas detection modules **1** in the plurality of air cleaning devices **2** through wireless communication via the router **5**. Then, the control command is transmitted to the driving control component **23** for enabling and controlling the fan **21** to guide the air pollution to pass through the filter element **22**, thereby reaching an air pollution state of the indoor field A to a cleanroom class based on the detection time.

[0037] In some other embodiments, the gas detection modules **1** in the plurality of air cleaning devices **2** also receive the air pollution data by connecting to the central control device **3** through wired communication, and then, the central control device **3** transmits the air pollution data to the router **5** through wireless communication. The cloud computing server **4** receives and stores the air pollution data transmitted from the router **5** to form a database of air pollution data. The cloud computing server **4** further performs an intelligence computing for comparison based on the air pollution data, and intelligently selects and issues a control command to the central control device **3** for further transmitting to the gas detection modules **1** in the plurality of air cleaning devices **2** through wired communication. Then, the control command is transmitted to the driving control component **23** for enabling and controlling the fan **21** to guide the air pollution to pass through the filter element **22**, thereby reaching an air pollution state of the indoor field A to a cleanroom class based on the detection time.

[0038] In the embodiment, the gas detection modules **1** in the plurality of air cleaning devices **2** are connected to the central control device **3** through wired communication or wireless communication under the handshake protocol. If the wireless communication or the wired communication is disconnected, a mechanism for activating and selecting one of the wired communication and the wireless communication which functions normally is enabled. The cloud computing service device **4** receives the air pollution data through the activated and selected wired communication or wireless communication, performs an intelligence computing for comparison based on the air pollution data, and intelligently selects and issues a control command to the gas detection modules **1** in the plurality of air cleaning devices **2** through the activated and selected wired communication or the wireless communication. Then, the control command is further transmitted to the driving control component **23** for enabling and controlling the fan **21** to guide the air pollution to pass through the filter element **22**, thereby reaching an air pollution state of the indoor field A to a cleanroom class based on the detection time.

[0039] In the embodiment, the gas detection modules **1** in the plurality of air cleaning devices **2** are connected to the central control device **3** through wired communication or wireless communication under the handshake protocol. If both of the wired communication and the wireless communication are disconnected, the gas detection modules **1** in the plurality of air cleaning devices **2** autonomously compute and compare the detected air pollution data, and issues the control command to the driving control component **23** to control and enable the fan **21** so as to guide the air pollution to pass through the filter element **22**, thereby reaching a gas state of the indoor field A to a cleanroom class with a level of air pollution close to zero. Notably, the intelligence computing includes an artificial intelligence (AI) computing and an edge computing.

[0040] The implementations of the indoor air cleaning system in the indoor field A of the present disclosure can be understood through the descriptions above, and the following are the details of disposing the plurality of air cleaning devices **2** in the indoor field A. In one embodiment, the air cleaning device **2** is disposed in the indoor field A in a build-in or plug-in manner. If the air cleaning device **2** is disposed in the indoor field A in a build-in manner (as shown in FIG. **1**A and FIG. **1**B), at least one circulation gas-returning channel C is disposed in the indoor field A, wherein the circulation gas-returning channel C is isolated by a plurality of partitions C**1** and formed as side walls of the indoor field A, and includes a plurality of gas-introducing openings C**2** and a plurality of gas-returning openings C**3**.

[0041] In one embodiment, the air cleaning device **2** includes a gas exchanging device **2***a*. The gas exchanging device **2***a* is disposed in the circulation gas-return channel C of the indoor field A and corresponds to the gas-introducing openings C**2** so as to fluidly communicate with the outdoor field B through a channel (not shown) for gas exchanging. The gas detection module **1** in the air cleaning device **2***a* receives the control command via the wireless communication or the wired communication and transmits the control command to the driving control component **23** for enabling the fan **21**. In the embodiment, at least one gas detection module **1** is disposed in the outdoor field B and at least one gas detection module **1** is disposed in the indoor field A. The cloud computing server **4** receives the air pollution data of the indoor field A and the outdoor field B, stores the air pollution data to form a database of air pollution data, and performs an intelligence computing to compare the air pollution data of the indoor field A and the outdoor field B. When the value of the air pollution data of the indoor field A is higher than the value of the air pollution data of the outdoor field B, the cloud computing server **4** issues the control command to the gas detection module **1** in the gas exchanging device **2**_a_ through the wireless communication or the wired communication for further transmitting to the driving control component **23** so as to enable and control the fan **21**, thereby introducing the gas from the outdoor field B into the indoor field A for gas exchanging. In the embodiment, the air pollution data of the indoor field A and the outdoor field B includes information of carbon dioxide (CO.sub.2), and the value of carbon dioxide (CO.sub.2) detected by the gas detection module **1** has to be maintained below a safety value of 800 PPM. If the value of the air pollution data exceeds the safety value, the gas exchanging device **2**_a_ introduces the gas from the outdoor field B into the indoor field A for gas exchanging. Notably, the gas exchanging device **2**_a_ is a fresh air fan or an energy recovery ventilation.

[0042] Please refer to FIG. **1**A, FIG. **1**B and FIG. **3**C, preferably but not exclusively, the air cleaning device **2** includes a circulation filtration device **2**_b_. The circulation filtration device **2**_b_ is disposed in the circulation gas-return channel C of the indoor field A and corresponds to the gas-introducing openings C**2** for guiding the air pollution to pass through the filter element **22** for filtration and then exhaust into the indoor field A through the gas-introducing opening C**2**. The gas detection module **1** in the circulation filtration device **2**_b_ outputs the air pollution data through the wireless communication or the wired communication, and the cloud computing server **4** receives the air pollution data, stores the air pollution data to form the database of air pollution data, performs the intelligence computing for comparison, and intelligently selects and issues the control command. The gas detection module **1** receives the control command through the wireless communication or the wired communication and transmits the control command to the driving control component **23** to enable the fan **21** of the circulation filtration device **2**_b_ for guiding the air pollution to pass through the filer element **22** for filtration and then exhaust into the indoor field A, thereby making the air pollution state of the indoor field A specified by accumulated numbers of 1 nm-2.5 μm suspended particulates detected by the plurality of gas detection modules **1** within 24 hours meets a cleanliness of ZAPClean room 1-12.

[0043] Please refer to FIG. **1**B, FIG. **1**C and FIG. **3**C, preferably but not exclusively, the air cleaning device **2** includes a negative pressure exhaust fan **2**_c_, which is disposed in a kitchen unit A**1** in the indoor field A. The negative pressure exhaust fan **2**_c_ is disposed in the circulation gas-return channel C of the indoor field A and corresponds to the gas-introducing openings C**2** so as to fluidly communicate with the outdoor field B through a channel (not shown) for speeding up the exhausting of the air pollution to the outdoor field B. The gas detection module **1** in the negative pressure exhaust fan **2**_c_ outputs the air pollution data, and the cloud computing server **4** receives the air pollution data, stores the air pollution data to form the database of air pollution data, performs the intelligence computing for comparison, and intelligently selects and issues the control command. The gas detection module **1** receives the control command through the wireless communication or the wired communication and transmits the control command to the driving control component **23** to enable the fan **21** of the negative pressure exhaust fan **2**_c_, thereby guiding the air pollution to pass through the filer element **22** for filtration and thus speeding up the exhausting of the air pollution in the indoor field A to the outdoor field B. Notably, the negative pressure exhaust fan **2**_c_ is disposed in front of a cooking equipment D for directly inhaling and exhaling the air pollution, thereby preventing the cook from smelling cooking odors and also avoiding the air pollution from diffusing to other spaces, such as living room, but not limited thereto.

[0044] Please refer to FIG. **1**B, FIG. **1**C and FIG. **3**C, preferably but not exclusively, the air cleaning device **2** includes a range hood **2**_d_, which is disposed in a kitchen unit A**1** in the indoor field A. The range hood **2**_d_ is disposed in the circulation gas-returning channel C of the indoor field A so as to fluidly communicate with the outdoor field B through a channel (not shown) for speeding up the exhausting of the air pollution to the outdoor field B. The gas detection module **1** in the range hood **2**_d_ outputs the air pollution data, and the cloud computing server **4** receives the air pollution data, stores the air pollution data to form the database of air pollution data, performs the intelligence computing for comparison, and intelligently selects and issues the control command. The gas detection module **1** receives the control command through the wireless communication or the wired communication and transmits the control command to the driving control component **23** to enable the fan **21** of the range hood **2***d*, thereby guiding the air pollution to pass through the filer element **22** for filtration and thus speeding up the exhausting of the air pollution in the indoor field A to the outdoor field B.

[0045] Please refer to FIG. **1**B and FIG. **3**C, preferably but not exclusively, the air cleaning device **2** includes a bathroom exhaust fan **2***e*, which is disposed in a bathroom unit A**2** in the indoor field A. The bathroom exhaust fan **2***e* is disposed in the circulation gas-returning channel C of the indoor field A so as to fluidly communicate with the outdoor field B through a channel (not shown) for speeding up the exhausting of the air pollution to the outdoor field B. The gas detection module **1** in the bathroom exhaust fan **2***e* outputs the air pollution data, and the cloud computing server **4** receives the air pollution data, stores the air pollution data to form the database of air pollution data, performs the intelligence computing for comparison, and intelligently selects and issues the control command. The gas detection module **1** receives the control command through the wireless communication or the wired communication and transmits the control command to the driving control component **23** to enable the fan **21** of the bathroom exhaust fan **2***e*, thereby guiding the air pollution to pass through the filer element **22** for filtration and thus speeding up the exhausting of the air pollution in the indoor field A to the outdoor field B, and at the same time, adjusting the temperature and humidity of the bathroom unit A**2** in the indoor field A. Notably, the adjusting of temperature and humidity of the bathroom unit A**2** in the indoor field A is to maintain the temperature at 25° C.±3° C. and the humidity within a range of 50%±10%.

[0046] Please refer to FIG. **3**A and FIG. **3**B. In the embodiment, the fan **21** of the air cleaning device **2** is enabled and controlled to guide the air pollution to pass through the filter element **22** for filtration. In the embodiment, the filter element **22** includes an ultra low penetration air (ULPA) filter screen or a high efficiency particulate air (HEPA) filter screen which is configured to absorb the chemical smoke, the bacteria, the dust particles and the pollen contained in the air pollution for achieving the effect of filtration and purification.

[0047] In the embodiment, the filter element **22** is further combined with a material for providing sterilization effect in physical or chemical means by passing therethrough the air pollution, and the airflow of the fan **21** flows in the path indicated by the arrows in FIG. **3**A. As shown in FIG. **3**B, the filter element **22** is combined with a decomposition layer through coating for sterilizing in chemical means. Preferably but not exclusively, the decomposition layer includes an activated carbon **22***a* configured to remove organic and inorganic substances in the air pollution, and remove colored and odorous substances. Preferably but not exclusively, the decomposition layer includes a cleansing factor containing chlorine dioxide layer **22***b* configured to inhibit viruses, bacteria, fungi, influenza A, influenza B, enterovirus and norovirus in the air pollution, and the inhibition ratio can reach 99% and more, thereby reducing the cross-infection of viruses. Preferably but not exclusively, the decomposition layer includes an herbal protective layer **22***c* extracted from ginkgo and Japanese *Rhus chinensis* configured to resist allergy effectively and destroy a surface protein of influenza virus (such as H1N1 influenza virus) passing therethrough. Preferably but not exclusively, the decomposition layer includes a silver ion **22***d* configured to inhibit viruses, bacteria and fungi contained in the air pollution. Preferably but not exclusively, the decomposition layer includes a zeolite **22***e* configured to remove ammonia nitrogen, heavy metals, organic pollutants, *Escherichia coli*, phenol, chloroform and anionic surfactants.

[0048] Furthermore, in some embodiments, the filter element **22** is combined with a light irradiation element to sterilize in chemical means. Preferably but not exclusively, the light irradiation element is a photo-catalyst unit including a photo catalyst **22***f* and an ultraviolet lamp **22***g*. When the photo catalyst **22***f* is irradiated by the ultraviolet lamp **22***g*, the light energy is converted into the electrical energy, thereby decomposing harmful substances and disinfects bacteria contained in the air pollution, so as to achieve the effects of filtration and purification. Preferably but not exclusively, the light irradiation element is a photo-plasma unit including a nanometer irradiation tube **22***h*. When the introduced air pollution is irradiated by the nanometer irradiation tube **22***h*, the oxygen molecules and water molecules contained in the air pollution are decomposed into high oxidizing photo-plasma, and an ion flow capable of destroying organic molecules is generated. In that, volatile formaldehyde, volatile toluene and volatile organic compounds (VOC) contained in the air pollution are decomposed into water and carbon dioxide, so as to achieve the effects of filtration and purification. Notably, in the embodiment, as shown in FIG. **3**D, the air cleaning device **2** further includes an ultraviolet lamp assembly **26**. The ultraviolet lamp assembly **26** includes a relay **26***a* for outputting an AC power to a power switch **26***b* based on the AC power inputted from the power conversion component **11** and the regulation signal (the GPIO (General-Purpose Input/Output) signal) outputted by the microcontroller **13**, and the power switch **26***b* enables and regulates the ultraviolet lamp **22***g*. The ultraviolet lamp **22***g* is disposed at one side of the filter element **22** for sterilizing the air pollution passing therethrough.

[0049] Moreover, in some embodiments, the filter element **22** is combined with a decomposition unit to sterilize in chemical means. Preferably but not exclusively, the decomposition unit is a negative ion unit **22***i* which makes the suspended particles carrying positive charges in the air pollution to adhere to negative charges, thereby achieving the effects of filtration and sterilization. Preferably but not exclusively, the decomposition unit is a plasma ion unit **22***j*. The oxygen molecules and water molecules contained in the air pollution are decomposed into positive hydrogen ions (H.sup.+) and negative oxygen ions (O.sup.2−) by the plasma ion. The substances attached with water around the ions are adhered on the surfaces of viruses and bacteria and converted into OH radicals with extremely strong oxidizing power, thereby removing hydrogen (H) from the protein on the surfaces of viruses and bacteria, and thus decomposing (oxidizing) the protein, so as to filter the introduced air pollution and achieve the effects of filtering and sterilization.

[0050] Please refer to FIG. **5**. In the embodiment, the cloud computing server **4** includes a wireless network cloud computing service module **41**, a cloud control service unit **42**, a device management unit **43** and an application program unit **44**. The wireless network cloud computing service module **41** receives the air pollution data detected by the gas detection modules **1** of the outdoor field B and the indoor field A, receives communication information of the plurality of air cleaning devices **2** (the gas exchanging device **2***a*, the circulation filtration device **2***b*, the negative pressure exhaust fan **2***c*, the range hood **2***d*, the bathroom exhaust fan **2***e*), and transmits the control command. Moreover, the wireless network cloud computing service module **41** receives the air pollution data of the indoor field A and the outdoor field B and transmits thereof to the cloud control service unit **42** to store and form the database of air pollution data, and performs the intelligence computing and comparison based on the database of air pollution data for transmitting the control command to the wireless network cloud computing service module **41** and then to devices, such as the air cleaning device **2**, the central control device **3**, and the gas exchanging device **2***a*, for enablement. The device management unit **43** receives the communication information of the plurality of air cleaning devices **2** (the gas exchanging device **2***a*, the circulation filtration device **2***b*, the negative pressure exhaust fan **2***c*, the range hood **2***d*, the bathroom exhaust fan **2***e*) through the wireless network cloud computing service module **41** for managing the user login and device binding, and the device management information can be provided to the application program unit **44** for system control and management. The application program unit **44** can also display and inform the air pollution data obtained from the cloud control service unit **42**, so the user can know the real-time status of air pollution removal through the mobile phone or the communication device. Moreover, the user can control the operation of the indoor air cleaning system through the application program unit **44** of the mobile phone or the communication device.

[0051] In view of above, the present disclosure provides an indoor air cleaning system. In the specific implementations, each air cleaning device **2** is equipped with a gas detection module **1** for detecting air pollution, outputting air pollution data, and receiving and transmitting the control command to the driving control component **23**, which is electrically connected to the air cleaning device **2**, so that the driving control component **23** controls the enablement of the fan **21** of the air cleaning device **2**. Moreover, the communication utilized by the gas detection module **1** to output the air pollution data includes dual ways, the wired communication and the wireless communication, and through the handshake protocol and autonomous judging, one of the wired communication and the wireless communication which functions normally is selected to perform the transmission of the detected air pollution data to the cloud computing server **4**. Then, the cloud computing server **4** generates and feedbacks the control command to the gas detection module **1** for further transmitting to the driving control component **23** electrically connected therewith, so as to control the enablement of the fan **21** of the air cleaning device **2**. Whereby, a mechanism for detecting and preventing disconnection of the wireless communication or the wired communication is achieved. On the other hand, if both the wired communication and the wireless communication are disconnected when the gas detection module **1** outputs the air pollution data, the gas detection module **1** autonomously computes and compares the air pollution data, and issues the control command to the driving control component **23** of the air cleaning device **2** to enable the fan **21** for guiding the air pollution to pass through the filter element **22**, thereby making the air pollution state of the indoor field A specified by accumulated numbers of 1 nm-2.5 μm suspended particulates detected by the plurality of gas detection modules **1** within 24 hours to meet the cleanliness of ZAPClean room 1-12.

[0052] Furthermore, in the indoor air cleaning system of the present disclosure, by receiving the air pollution data of the indoor field A and the outdoor field B through the wireless communication or the wired communication, storing thereof to form the database of air pollution data, and performing the intelligence computing for comparison based on the database of air pollution data, the cloud computing server **4** intelligently selects and issues the control command to enable the fan **21** of the air cleaning device **2** for continuously generating an internal directional circulation airflow in the indoor field A so as to guide the air pollution to pass through the filter element **22** multiple times for filtration. That is, the cloud computing server **4** intelligently computes the cleanliness of real time number of suspended particulates in the indoor field A and intelligently selects and issues the control command to the plurality of air cleaning devices **2** for timely enabling the fans **21** of the air cleaning devices **2**, so that the air volume and start-up period of the fans **21** can be adjusted based on the cleanliness of real time number of suspended particulates, thereby improving the cleaning efficiency of the indoor field A, reducing the environment noise of the indoor field A, and generating the internal directional circulation airflow in the indoor field A to guide the air pollution to pass through the filter element **22** multiple times for filtration. In that, the air pollution state of the indoor field A specified by accumulated numbers of 1 nm-2.5 μm suspended particulates detected by the plurality of gas detection modules **1** within 24 hours can meet the cleanliness of ZAPClean room 1-12.

[0053] The above-mentioned cleanliness specification of ZAPClean room 1-12 is equal to that of ISO 1-9 classes. Although the cleanliness specification of ZAPClean 1-12 has different architecture from that of ISO 1-9 classes, it can identically achieve the cleanliness equal to the conventional ISO 1-9 classes. Generally, the cleanroom of conventional ISO 1-9 classes is not equipped with the sensor for a whole day real time detection, so that the system has to operate in high speed for 24 hours, thereby resulting in large energy consumption and a high-noise environment, which is not applicable to the general living environment.

[0054] The indoor air cleaning system of the present disclosure employs the cleanliness of ZAPClean room 1-12. In the indoor air cleaning system of the present disclosure, the gas detection modules **1** installed in the plurality of air cleaning devices **2** (the gas exchanging device **2***a*, the circulation filtration device **2***b*, the negative pressure exhaust fan **2***c*, the range hood **2***d*, the bathroom exhaust fan **2**_e_) are utilized to intelligently link to the cloud computing server **4**, and the gas detection modules **1** disposed inside and outside the device are used to detect PM2.5 concentration/particle number, carbon dioxide (CO.sub.2), carbon monoxide (CO), formaldehyde, methane, toluene, total volatile organic compounds (TVOC), ozone (O.sub.3), nitrogen dioxide (NO.sub.2), sulfur dioxide (SO.sub.2), radon (Rn-222), bacteria, fungi and virus, so that through the wireless communication or the wired communication, the cloud computing server **4** intelligently computes, selects and issues the control command to the gas detection modules **1** in the plurality of air cleaning devices **2** for controlling the enablement, the air volume and the noise level of the fans **21**, thereby achieving a quiet and high efficient system which meets the cleanliness of ZAPClean room.

[0055] Please refer to FIG. **6**. For the indoor field specified by having 21,000 of 1 nm-2.5 μm suspended particulates detected and accumulated within 24 hours, the air pollution state thereof meets the cleanliness of ZAPClean room 1 with the air pollution data including an average of detected PM2.5≤0.000000012 μg/m.sup.3, an average of detected PM10≤0.000000019 μg/m.sup.3, the sampled bacteria per cubic meter ≤0 CFU/m.sup.3, the sampled fungi per cubic meter ≤0 CFU/m.sup.3, an average of formaldehyde ≤0.00028 ppm per hour, an average of total volatile organic compounds (TVOC)≤0.00094 ppm per hour, an average of carbon dioxide ranged in 500-650 ppm every hour, an average of carbon monoxide ≤0.03149 ppm every hour, and an average of ozone ≤0.00021 ppm every hour.

[0056] For the indoor field specified by having 210,000 of 1 nm-2.5 μm suspended particulates detected and accumulated within 24 hours, the air pollution state thereof meets the cleanliness of ZAPClean room 2 with the air pollution data including an average of detected PM2.5≤0.00000012 μg/m.sup.3, an average of detected PM10≤0.00000019 μg/m.sup.3, the sampled bacteria per cubic meter 50 CFU/m.sup.3, the sampled fungi per cubic meter 50 CFU/m.sup.3, an average of formaldehyde ≤0.00047 ppm per hour, an average of total volatile organic compounds (TVOC)≤0.00157 ppm per hour, an average of carbon dioxide ranged in 500-650 ppm every hour, an average of carbon monoxide ≤0.05249 ppm every hour, and an average of ozone ≤0.00035 ppm every hour.

[0057] For the indoor field specified by having 2,100,000 of 1 nm-2.5 μm suspended particulates detected and accumulated within 24 hours, the air pollution state thereof meets the cleanliness of ZAPClean room 3 with the air pollution data including an average of detected PM2.5≤0.00000124 μg/m.sup.3, an average of detected PM10≤0.0000019 μg/m.sup.3, the sampled bacteria per cubic meter ≤0 CFU/m.sup.3, the sampled fungi per cubic meter ≤0 CFU/m.sup.3, an average of formaldehyde ≤0.00078 ppm per hour, an average of total volatile organic compounds (TVOC)≤0.00261 ppm per hour, an average of carbon dioxide ranged in 500-650 ppm every hour, an average of carbon monoxide ≤0.08748 ppm every hour, and an average of ozone ≤0.00058 ppm every hour.

[0058] For the indoor field specified by having 21,000,000 of 1 nm-2.5 μm suspended particulates detected and accumulated within 24 hours, the air pollution state thereof meets the cleanliness of ZAPClean room 4 with the air pollution data including an average of detected PM2.5≤0.00001235 μg/m.sup.3, an average of detected PM10≤0.0000185 μg/m.sup.3, the sampled bacteria per cubic meter ≤0 CFU/m.sup.3, the sampled fungi per cubic meter ≤0 CFU/m.sup.3, an average of formaldehyde ≤0.00130 ppm per hour, an average of total volatile organic compounds (TVOC)≤0.00435 ppm per hour, an average of carbon dioxide ranged in 500-650 ppm every hour, an average of carbon monoxide ≤0.14580 ppm every hour, and an average of ozone ≤0.00097 ppm every hour.

[0059] For the indoor field specified by having 210,000,000 of 1 nm-2.5 μm suspended particulates detected and accumulated within 24 hours, the air pollution state thereof meets the cleanliness of ZAPClean room 5 with the air pollution data including an average of detected PM2.5≤0.00012353 μg/m.sup.3, an average of detected PM10≤0.0001853 μg/m.sup.3, the sampled bacteria per cubic meter ≤1 CFU/m.sup.3, the sampled fungi per cubic meter ≤1 CFU/m.sup.3, an average of formaldehyde ≤0.00216 ppm per hour, an average of total volatile organic compounds (TVOC)≤0.00726 ppm per hour, an average of carbon dioxide ranged in 500-650 ppm every hour, an average of carbon monoxide ≤0.24300 ppm every hour, and an average of ozone ≤0.00162 ppm every hour.

[0060] For the indoor field specified by having 2,100,000,000 of 1 nm-2.5 μm suspended particulates detected and accumulated within 24 hours, the air pollution state thereof meets the cleanliness of ZAPClean room 6 with the air pollution data including an average of detected PM2.5≤0.00123529 μg/m.sup.3, an average of detected PM10≤0.0018529 μg/m.sup.3, the sampled bacteria per cubic meter ≤3 CFU/m.sup.3, the sampled fungi per cubic meter ≤3 CFU/m.sup.3, an average of formaldehyde ≤0.00360 ppm per hour, an average of total volatile organic compounds (TVOC)≤0.01210 ppm per hour, an average of carbon dioxide ranged in 500-650 ppm every hour, an average of carbon monoxide ≤0.40500 ppm every hour, and an average of ozone ≤0.00270 ppm every hour.

[0061] For the indoor field specified by having 21,000,000,000 of 1 nm-2.5 μm suspended particulates detected and accumulated within 24 hours, the air pollution state thereof meets the cleanliness of ZAPClean room 7 with the air pollution data including an average of detected PM2.5≤0.01235294 μg/m.sup.3, an average of detected PM10≤0.0185294 μg/m.sup.3, the sampled bacteria per cubic meter ≤8 CFU/m.sup.3, the sampled fungi per cubic meter ≤8 CFU/m.sup.3, an average of formaldehyde ≤0.00600 ppm per hour, an average of total volatile organic compounds (TVOC)≤0.02016 ppm per hour, an average of carbon dioxide ranged in 500-650 ppm every hour, an average of carbon monoxide ≤0.67500 ppm every hour, and an average of ozone ≤0.00450 ppm every hour.

[0062] For the indoor field specified by having 105,000,000,000 of 1 nm-2.5 μm suspended particulates detected and accumulated within 24 hours, the air pollution state thereof meets the cleanliness of ZAPClean room 8 with the air pollution data including an average of detected PM2.5≤0.06176471 μg/m.sup.3, an average of detected PM10≤0.0926471 μg/m.sup.3, the sampled bacteria per cubic meter ≤15 CFU/m.sup.3, the sampled fungi per cubic meter ≤15 CFU/m.sup.3, an average of formaldehyde ≤0.009 ppm per hour, an average of total volatile organic compounds (TVOC)≤0.02688 ppm per hour, an average of carbon dioxide ranged in 500-800 ppm every hour, an average of carbon monoxide ≤1.0125 ppm every hour, and an average of ozone ≤0.00675 ppm every hour.

[0063] For the indoor field specified by having 210,000,000,000 of 1 nm-2.5 μm suspended particulates detected and accumulated within 24 hours, the air pollution state thereof meets the cleanliness of ZAPClean room 9 with the air pollution data including an average of detected PM2.5≤0.12 μg/m.sup.3, an average of detected PM10≤0.1852941 μg/m.sup.3, the sampled bacteria per cubic meter ≤20 CFU/m.sup.3, the sampled fungi per cubic meter ≤20 CFU/m.sup.3, an average of formaldehyde ≤0.012 ppm per hour, an average of total volatile organic compounds (TVOC)≤0.0336 ppm per hour, an average of carbon dioxide ranged in 500-800 ppm every hour, an average of carbon monoxide ≤1.35 ppm every hour, and an average of ozone 50.009 ppm every hour.

[0064] For the indoor field specified by having 1,050,000,000,000 of 1 nm-2.5 μm suspended particulates detected and accumulated within 24 hours, the air pollution state thereof meets the cleanliness of ZAPClean room 10 with the air pollution data including an average of detected PM2.5≤0.62 μg/m.sup.3, an average of detected PM10≤0.9264706 μg/m.sup.3, the sampled bacteria per cubic meter ≤100 CFU/m.sup.3, the sampled fungi per cubic meter ≤80 CFU/m.sup.3, an average of formaldehyde ≤0.018 ppm per hour, an average of total volatile organic compounds (TVOC)≤0.0728 ppm per hour, an average of carbon dioxide ranged in 500-800 ppm every hour, an average of carbon monoxide ≤2.025 ppm every hour, and an average of ozone ≤0.0135 ppm every hour.

[0065] For the indoor field specified by having 2,100,000,000,000 of 1 nm-2.5 μm suspended particulates detected and accumulated within 24 hours, the air pollution state thereof meets the cleanliness of ZAPClean room 11 with the air pollution data including an average of detected PM2.5≤1.24 μg/m.sup.3, an average of detected PM10≤1.85 μg/m.sup.3, the sampled bacteria per cubic meter ≤200 CFU/m.sup.3, the sampled fungi per cubic meter ≤150 CFU/m.sup.3, an average of formaldehyde ≤0.024 ppm per hour, an average of total volatile organic compounds (TVOC)≤0.112 ppm per hour, an average of carbon dioxide ranged in 500-800 ppm every hour, an average of carbon monoxide ≤2.7 ppm every hour, and an average of ozone ≤0.018 ppm every hour.
[0066] For the indoor field specified by having 21,000,000,000,000 of 1 nm-2.5 μm suspended particulates detected and accumulated within 24 hours, the air pollution state thereof meets the cleanliness of ZAPClean room 12 with the air pollution data including an average of detected PM2.5≤12.35 μg/m.sup.3, an average of detected PM10≤18.53 μg/m.sup.3, the sampled bacteria per cubic meter 51500 CFU/m.sup.3, the sampled fungi per cubic meter ≤750 CFU/m.sup.3, an average of formaldehyde ≤0.08 ppm per hour, an average of total volatile organic compounds (TVOC)≤0.56 ppm per hour, an average of carbon dioxide ranged in 800-1000 ppm every hour, an average of carbon monoxide ≤9 ppm every hour, and an average of ozone ≤0.06 ppm every hour.
[0067] In summary, the present disclosure provides an indoor air cleaning system including a plurality of gas detection modules, a plurality of air cleaning devices and at least one central control device. Through disposing the gas detection module in each of the air cleaning devices in electric connection, the air pollution is detected and the operation is regulated. Moreover, the connection of the central control device to the gas detection modules is achieved through one of the wired communication and the wireless communication selected under the handshake protocol for providing the operation instruction to the gas detection modules to control the enablement, air volume and noise level of the fans of the plurality of air cleaning devices, so as to guide the air pollution to pass through the filter elements of the plurality of air cleaning devices for filtration, thereby making the air pollution state of the indoor field specified by accumulated numbers of 1 nm-2.5 μm suspended particulates detected by the plurality of gas detection modules within 24 hours to meet a cleanliness of ZAPClean room 1-12. Accordingly, the impact and injury for human health caused by the gas hazards in the environment can be avoided. Thus, the present disclosure is extremely industrially applicable.
[0068] While the disclosure has been described in terms of what is presently considered to be the most practical and preferred embodiments, it is to be understood that the disclosure needs not be limited to the disclosed embodiment. On the contrary, it is intended to cover various modifications and similar arrangements included within the spirit and scope of the appended claims which are to be accorded with the broadest interpretation so as to encompass all such modifications and similar structures.

Claims

1. An indoor air cleaning system, comprising: a plurality of gas detection modules for detecting an air pollution and generating air pollution data so as to compute and output a plurality of regulation signals; a plurality of air cleaning devices disposed in an indoor field, wherein each of the plurality of air cleaning device comprises a fan, a filter element and a driving control component and has at least one of the plurality of gas detection modules disposed therein and electrically connected to the driving control component thereof for controlling an enablement, an air volume and a noise level of the fan thereof, so as to guide the air pollution to pass through the filter element thereof for filtration; and at least one central control device connected with the plurality of gas detection modules through a wired communication or a wireless communication under a handshake protocol for providing an operation instruction to the plurality of gas detection modules to control operations of the fans of the plurality of air cleaning devices and receiving the air pollution data detected by the plurality of gas detection modules for real time display, wherein an air pollution state of the indoor field specified by accumulated numbers of 1 nm-2.5 μm suspended particulates detected by the plurality of gas detection modules within 24 hours meets a cleanliness of ZAPClean room 1-12.

2. The indoor air cleaning system according to claim 1, wherein the air pollution state of the indoor field meets a cleanliness of: ZAPClean room 1: the air pollution data for the indoor field specified by having 21,000 of 1 nm-2.5 μm suspended particulates detected and accumulated within 24 hours comprises an average of detected PM2.5≤0.000000012 μg/m.sup.3, an average of detected PM10≤0.000000019 μg/m.sup.3, the sampled bacteria per cubic meter ≤0 CFU/m.sup.3, the sampled fungi per cubic meter ≤0 CFU/m.sup.3, an average of formaldehyde ≤0.00028 ppm per hour, an average of total volatile organic compounds (TVOC)≤0.00094 ppm per hour, an average of carbon dioxide ranged in 500-650 ppm every hour, an average of carbon monoxide ≤0.03149 ppm every hour, and an average of ozone ≤0.00021 ppm every hour; or ZAPClean room 2: the air pollution data for the indoor field specified by having 210,000 of 1 nm-2.5 μm suspended particulates detected and accumulated within 24 hours comprises an average of detected PM2.5≤0.00000012 μg/m.sup.3, an average of detected PM10≤0.00000019 μg/m.sup.3, the sampled bacteria per cubic meter ≤0 CFU/m.sup.3, the sampled fungi per cubic meter ≤0 CFU/m.sup.3, an average of formaldehyde ≤0.00047 ppm per hour, an average of total volatile organic compounds (TVOC)≤0.00157 ppm per hour, an average of carbon dioxide ranged in 500-650 ppm every hour, an average of carbon monoxide ≤0.05249 ppm every hour, and an average of ozone ≤0.00035 ppm every hour.

3. The indoor air cleaning system according to claim 1, wherein the air pollution state of the indoor field meets a cleanliness of: ZAPClean room 3: the air pollution data for the indoor field specified by having 2,100,000 of 1 nm-2.5 μm suspended particulates detected and accumulated within 24 hours comprises an average of detected PM2.5≤0.00000124 μg/m.sup.3, an average of detected PM10≤0.0000019 μg/m.sup.3, the sampled bacteria per cubic meter ≤0 CFU/m.sup.3, the sampled fungi per cubic meter ≤0 CFU/m.sup.3, an average of formaldehyde ≤0.00078 ppm per hour, an average of total volatile organic compounds (TVOC)≤0.00261 ppm per hour, an average of carbon dioxide ranged in 500-650 ppm every hour, an average of carbon monoxide ≤0.08748 ppm every hour, and an average of ozone ≤0.00058 ppm every hour; or ZAPClean room 4: the air pollution data for the indoor field specified by having 21,000,000 of 1 nm-2.5 μm suspended particulates detected and accumulated within 24 hours comprises an average of detected PM2.5≤0.00001235 μg/m.sup.3, an average of detected PM10≤0.0000185 μg/m.sup.3, the sampled bacteria per cubic meter ≤0 CFU/m.sup.3, the sampled fungi per cubic meter ≤0 CFU/m.sup.3, an average of formaldehyde ≤0.00130 ppm per hour, an average of total volatile organic compounds (TVOC)≤0.00435 ppm per hour, an average of carbon dioxide ranged in 500-650 ppm every hour, an average of carbon monoxide ≤0.14580 ppm every hour, and an average of ozone ≤0.00097 ppm every hour.

4. The indoor air cleaning system according to claim 1, wherein the air pollution state of the indoor field meets a cleanliness of: ZAPClean room 5: the air pollution data for the indoor field specified by having 210,000,000 of 1 nm-2.5 μm suspended particulates detected and accumulated within 24 hours comprises an average of detected PM2.5≤0.00012353 μg/m.sup.3, an average of detected PM10≤0.0001853 μg/m.sup.3, the sampled bacteria per cubic meter ≤1 CFU/m.sup.3, the sampled fungi per cubic meter ≤1 CFU/m.sup.3, an average of formaldehyde ≤0.00216 ppm per hour, an average of total volatile organic compounds (TVOC)≤0.00726 ppm per hour, an average of carbon dioxide ranged in 500-650 ppm every hour, an average of carbon monoxide ≤0.24300 ppm every hour, and an average of ozone ≤0.00162 ppm every hour; or ZAPClean room 6: the air pollution data for the indoor field specified by having 2,100,000,000 of 1 nm-2.5 μm suspended particulates detected and accumulated within 24 hours comprises an average of detected PM2.5≤0.00123529 μg/m.sup.3, an average of detected PM10≤0.0018529 μg/m.sup.3, the sampled bacteria per cubic meter ≤3 CFU/m.sup.3, the sampled fungi per cubic meter ≤3 CFU/m.sup.3, an average of formaldehyde ≤0.00360 ppm per hour, an average of total volatile organic compounds (TVOC)≤0.01210 ppm per hour, an average of carbon dioxide ranged in 500-650 ppm every hour, an average of carbon monoxide ≤0.40500 ppm every hour, and an average of ozone ≤0.00270 ppm every hour.

5. The indoor air cleaning system according to claim 1, wherein the air pollution state of the indoor field meets a cleanliness of: ZAPClean room 7: the air pollution data for the indoor field specified by having 21,000,000,000 of 1 nm-2.5 μm suspended particulates detected and accumulated within 24 hours comprises an average of detected PM2.5≤0.01235294 μg/m.sup.3, an average of detected PM10≤0.0185294 μg/m.sup.3, the sampled bacteria per cubic meter ≤8 CFU/m.sup.3, the sampled fungi per cubic meter ≤8 CFU/m.sup.3, an average of formaldehyde ≤0.00600 ppm per hour, an average of total volatile organic compounds (TVOC)≤0.02016 ppm per hour, an average of carbon dioxide ranged in 500-650 ppm every hour, an average of carbon monoxide ≤0.67500 ppm every hour, and an average of ozone ≤0.00450 ppm every hour; or ZAPClean room 8: the air pollution data for the indoor field specified by having 105,000,000,000 of 1 nm-2.5 μm suspended particulates detected and accumulated within 24 hours comprises an average of detected PM2.5≤0.06176471 μg/m.sup.3, an average of detected PM10≤0.0926471 μg/m.sup.3, the sampled bacteria per cubic meter ≤15 CFU/m.sup.3, the sampled fungi per cubic meter ≤15 CFU/m.sup.3, an average of formaldehyde ≤0.009 ppm per hour, an average of total volatile organic compounds (TVOC)≤0.02688 ppm per hour, an average of carbon dioxide ranged in 500-800 ppm every hour, an average of carbon monoxide ≤1.0125 ppm every hour, and an average of ozone ≤0.00675 ppm every hour.

6. The indoor air cleaning system according to claim 1, wherein the air pollution state of the indoor field meets a cleanliness of: ZAPClean room 9: the air pollution data for the indoor field specified by having 210,000,000,000 of 1 nm-2.5 μm suspended particulates detected and accumulated within 24 hours comprises an average of detected PM2.5≤0.12 μg/m.sup.3, an average of detected PM10≤0.1852941 μg/m.sup.3, the sampled bacteria per cubic meter ≤20 CFU/m.sup.3, the sampled fungi per cubic meter ≤20 CFU/m.sup.3, an average of formaldehyde ≤0.012 ppm per hour, an average of total volatile organic compounds (TVOC)≤0.0336 ppm per hour, an average of carbon dioxide ranged in 500-800 ppm every hour, an average of carbon monoxide ≤1.35 ppm every hour, and an average of ozone ≤0.009 ppm every hour; or ZAPClean room 10: the air pollution data for the indoor field specified by having 1,050,000,000,000 of 1 nm-2.5 μm suspended particulates detected and accumulated within 24 hours comprises an average of detected PM2.5≤0.62 μg/m.sup.3, an average of detected PM10≤0.9264706 μg/m.sup.3, the sampled bacteria per cubic meter ≤100 CFU/m.sup.3, the sampled fungi per cubic meter ≤80 CFU/m.sup.3, an average of formaldehyde ≤0.018 ppm per hour, an average of total volatile organic compounds (TVOC)≤0.0728 ppm per hour, an average of carbon dioxide ranged in 500-800 ppm every hour, an average of carbon monoxide ≤2.025 ppm every hour, and an average of ozone ≤0.0135 ppm every hour.

7. The indoor air cleaning system according to claim 1, wherein the air pollution state of the indoor field meets a cleanliness of: ZAPClean room 11: the air pollution data for the indoor field specified by having 2,100,000,000,000 of 1 nm-2.5 μm suspended particulates detected and accumulated within 24 hours comprises an average of detected PM2.5≤1.24 μg/m.sup.3, an average of detected PM10≤1.85 μg/m.sup.3, the sampled bacteria per cubic meter ≤200 CFU/m.sup.3, the sampled fungi per cubic meter ≤150 CFU/m.sup.3, an average of formaldehyde ≤0.024 ppm per hour, an average of total volatile organic compounds (TVOC)≤0.112 ppm per hour, an average of carbon dioxide ranged in 500-800 ppm every hour, an average of carbon monoxide ≤2.7 ppm every hour, and an average of ozone ≤0.018 ppm every hour; or ZAPClean room 12: the air pollution data for the indoor field specified by having 21,000,000,000,000 of 1 nm-2.5 μm suspended particulates detected and accumulated within 24 hours comprises an average of detected PM2.5≤12.35 μg/m.sup.3, an average of detected PM10≤18.53 μg/m.sup.3, the sampled bacteria per cubic meter ≤1500 CFU/m.sup.3, the sampled fungi per cubic meter 5750 CFU/m.sup.3, an average of formaldehyde 50.08 ppm per hour, an average of total volatile organic compounds (TVOC)≤0.56 ppm per hour, an average of carbon dioxide ranged in 800-1000 ppm every hour, an average of carbon monoxide ≤9 ppm every hour, and an average of ozone ≤0.06 ppm every hour.

8. The indoor air cleaning system according to claim 1, further comprising a cloud computing server, wherein the cloud computing server receives the air pollution data detected by gas detection modules in the plurality of air cleaning devices through the wireless communication via a router, and stores the air pollution data to form a database of air pollution data, and the cloud computing server performs an intelligence computing for comparison based on the air pollution data, and intelligently selects and issues a control command to the at least one of the plurality of gas detection modules in the plurality of air cleaning devices through the wireless communication via the router, so as to further transmit the control command to the driving control components for enabling and controlling the fans to guide the air pollution to pass through the filter elements, thereby reaching an air pollution state of the indoor field to a cleanroom class.

9. The indoor air cleaning system according to claim 8, wherein gas detection modules in the plurality of air cleaning devices provide the air pollution data by connecting to the at least one central control device through the wired communication, and the at least one central control device transmits the air pollution data to the router through the wireless communication; and the cloud computing server receives and stores the air pollution data transmitted from the router to form the database of air pollution data, performs the intelligence computing for comparison based on the air pollution data, and intelligently selects and issues the control command to the at least one central control device for further transmitting the control command through the wired communication to the gas detection modules of the plurality of air cleaning devices, and then to the driving control components for enabling and controlling the fans to guide the air pollution to pass through the filter elements, thereby reaching an air pollution state of the indoor field to a cleanroom class.

10. The indoor air cleaning system according to claim 8, wherein gas detection modules in the plurality of air cleaning devices are connected to the at least one central control device through the wired communication or the wireless communication under the handshake protocol, wherein if the wireless communication or the wired communication is disconnected, a mechanism for activating and selecting one of the wired communication and the wireless communication which functions normally is enabled; and the cloud computing service device receives the air pollution data through the wired communication or the wireless communication activated and selected, performs an intelligence computing for comparison based on the air pollution data, and intelligently selects and issues a control command to the gas detection modules in the plurality of air cleaning devices through the wired communication or the wireless communication activated and selected, and the control command is further transmitted to the driving control components for enabling and controlling the fans to guide the air pollution to pass through the filter elements, thereby reaching an air pollution state of the indoor field to a cleanroom class.

11. The indoor air cleaning system according to claim 8, wherein gas detection modules in the plurality of air cleaning devices are connected to the at least one central control device through the wired communication or the wireless communication under the handshake protocol, wherein if both of the wired communication and the wireless communication are disconnected, the gas detection modules in the plurality of air cleaning devices autonomously compute and compare the air pollution data, and issues the control command to the driving control components to control and enable the fans so as to guide the air pollution to pass through the filter elements, thereby reaching a gas state of the indoor field to a cleanroom class.

12. The indoor air cleaning system according to claim 8, wherein at least one of the plurality of gas detection modules is disposed in the indoor field and at least one of the plurality of gas detection modules is disposed in the outdoor field for detecting the air pollution in the indoor field and the outdoor field and outputting the air pollution data, and the cloud computing server receives the air pollution data of the indoor field and the outdoor field, stores the air pollution data to form the database of air pollution data, and performs the intelligence computing to compare the air pollution data of the indoor field and the outdoor field, wherein when a value of the air pollution data of the indoor field is higher than a value of the air pollution data of the outdoor field, the cloud computing server issues the control command to the air cleaning device through the wired communication or the wireless communication; and wherein the air cleaning device comprises a gas exchanging device, and a gas detection module in the gas exchanging device receives the control command via the wired communication or the wireless communication for further transmitting the control command to the driving control component to enable the fan, thereby introducing a gas from the outdoor field into the indoor field for gas-exchanging.

13. The indoor air cleaning system according to claim 12, wherein the air pollution data detected by the at least one of the plurality of gas detection modules in the indoor field and the at least one of the plurality of gas detection modules in the outdoor field comprises information of carbon dioxide (CO.sub.2), and wherein the gas exchanging device comprises one selected from the group consisting of a fresh air fan, an energy recovery ventilation and a combination thereof.

14. The indoor air cleaning system according to claim 8, wherein the air cleaning device comprises a circulation filtration device, wherein a gas detection module in the circulation filtration device outputs the air pollution data to the cloud computing server through the wired communication or the wireless communication, the cloud computing server receives the air pollution data, stores the air pollution data to form the database of air pollution data, performs the intelligence computing for comparison, and intelligently selects and issues the control command, and the gas detection module receives the control command through the wired communication or the wireless communication and transmits the control command to the driving control component to enable the fan of the circulation filtration device for guiding the air pollution to pass through the filer element for filtration and then exhaust into the indoor field, thereby reaching an air pollution state of the indoor field to a cleanroom class.

15. The indoor air cleaning system according to claim 8, wherein the air cleaning device comprises a negative pressure exhaust fan disposed in a kitchen unit in the indoor field, wherein a gas detection module in the negative pressure exhaust fan outputs the air pollution data, the cloud computing server receives the air pollution data, stores the air pollution data to form the database of air pollution data, performs the intelligence computing for comparison, and intelligently selects and issues the control command, and the gas detection module receives the control command through the wired communication or the wired communication and transmits the control command to the driving control component to enable the fan of the negative pressure exhaust fan, thereby guiding the air pollution to pass through the filer element for filtration and speeding up an exhausting of the air pollution in the indoor field to the outdoor field.

16. The indoor air cleaning system according to claim 8, wherein the air cleaning device comprises a range hood disposed in a kitchen unit in the indoor field, wherein a gas detection module in the range hood outputs the air pollution data, the cloud computing server receives the air pollution data, stores the air pollution data to form the database of air pollution data, performs the intelligence computing for comparison, and intelligently selects and issues the control command, and the gas detection module receives the control command through the wired communication or the wireless communication and transmits the control command to the driving control component to enable the fan of the range hood, thereby guiding the air pollution to pass through the filer element for filtration and speeding up an exhausting of the air pollution in the indoor field to the outdoor field.

17. The indoor air cleaning system according to claim 8, wherein the air cleaning device comprises a bathroom exhaust fan disposed in a bathroom unit in the indoor field, wherein a gas detection module in the bathroom exhaust fan outputs the air pollution data, the cloud computing server receives the air pollution data, stores the air pollution data to form the database of air pollution data, performs the intelligence computing for comparison, and intelligently selects and issues the control command, and the gas detection module receives the control command through the wired communication or the wireless communication and transmits the control command to the driving control component to enable the bathroom exhaust fan, thereby guiding the air pollution to pass through the filer element for filtration and speeding up an exhausting of the air pollution in the indoor field to the outdoor field; and wherein a temperature of the indoor field is controlled to maintain at 25° C.±3° C., and a humidity of the indoor field is controlled to maintain in a range of 50%±10%.

18. The indoor air cleaning system according to claim 1, wherein each of the plurality of air cleaning devices further comprises a relay and a communication interface device, wherein the relay outputs an AC power to the driving control component for power regulation based on an AC power inputted from a power conversion component and a regulation signal outputted by a microcontroller, and the communication interface device controls the air volume of the fan of the air cleaning device based on a required DC voltage inputted from the power conversion component and a regulation signal outputted by the microcontroller through communicating with the driving control component via a communication control cable.

19. The indoor air cleaning system according to claim 1, wherein the filter element comprises one selected from the group consisting of an ultra low penetration air (ULPA) filter screen, a high efficiency particulate air (HEPA) filter screen, and a combination thereof.

20. The indoor air cleaning system according to claim 1, wherein each of the plurality of air cleaning devices further comprises an ultraviolet lamp assembly, wherein the ultraviolet lamp assembly comprises a relay for outputting an AC power to a power switch based on an AC power inputted from a power conversion component and a regulation signal outputted by a microcontroller, and the power switch enables and regulates the ultraviolet lamp, and the ultraviolet lamp is disposed at one side of the filter element for sterilizing the air pollution passing therethrough.

21. The indoor air cleaning system according to claim 8, wherein the cloud computing server comprises a wireless network cloud computing service module, a cloud control service unit, a device management unit and an application program unit, wherein the cloud computing server intelligently computes a cleanliness of real time number of suspended particulates in the indoor field and intelligently selects and issues the control command to the plurality of gas detection modules in the plurality of air cleaning devices and then to the driving control component for timely enabling the fans of the plurality of air cleaning devices, so that the air volume and a start-up period of the fan is adjusted based on the cleanliness of real time number of suspended particulates to improve a cleaning efficiency of the indoor field, reduce an environment noise of the indoor field, and generate an internal directional circulation airflow in the indoor field to guide the air pollution to pass through the filter element multiple times for filtration, thereby reaching the air pollution state of the indoor field to a cleanroom class.