INDOOR AIR CLEANING METHOD

FIELD OF THE INVENTION

[0001] The present disclosure relates to an indoor air cleaning method, and more particularly to an indoor air cleaning method implementing air pollution detection and coordinating the regulation operations based on the number of air cleaning devices required in the indoor field and the sampling period, and detecting the verification of the air pollution data in the indoor field, so that the indoor air cleaning method allows the gas state of the air pollution in the indoor field to reach a truly real cleanliness of clean room level ZAPClean room 6^{+}, 7^{+}, 6, 7, 6^{-} or 7^{-}.

BACKGROUND OF THE INVENTION

[0002] 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 of various countries. At present, how to detect the air quality and avoid the harm is a crucial issue that urgently needs to be solved.

[0003] In order to confirm the quality of the air, it is feasible to use a gas sensor to detect the air surrounding in the environment. If the detection information can be provided in real time to warn the people in the environment, it is helpful of avoiding the harm and facilitates the people to escape the hazard immediately, 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 detecting the air in the surrounding environment.

[0004] In addition, it is difficult to have the surveillance and control the indoor air quality. Besides the outdoor air quality, the indoor air-conditioning conditions and the pollution sources are the major factors affecting the indoor air quality. It is necessary to intelligently and quickly 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 indoor air quality in real time anytime, anywhere. Certainly, if the concentration of the suspended particles in the indoor space field is strictly controlled according to the "clean room" standard, it allows to avoid the introduction, generation and retention of suspended particles, and the temperature and humidity in the indoor space field are controlled within the required range. That is to say, the number of suspended particles in the air pollution of the indoor space field is used to distinguish their classifications, so that it allows the indoor space field to meet the clean room requirements for safe breathing.

[0005] At present, the air pollution detection of the indoor air purification system is implemented by the gas detector to transmit the air pollution information, and then the air pollution information is transmitted to the cloud computing service device through the Internet of Things communication, so that the air pollution information of the outdoor field and the indoor field is stored to form a big data database of air pollution data. Based on the intelligent calculation and comparison of the big data database of air pollution data, a control command is intelligently selected to be sent to the fan of the circulating filtering device to start the regulation operation. In that, an internal circulation directed airflow is continuously generated in the indoor field, and the air pollution is directed multiple times

through the filtering element to be filtered and removed, so that the gas state in the indoor field has suspended particles meeting a specific specification quantity to reach a cleanliness of clean room. How to provide an indoor air cleaning method to make the gas state of the air pollution in the indoor field to reach a truly real cleanliness of clean room level ZAPClean room 6^+, 7^+, 6, 7, 6^- or 7^- is the main subject of the present disclosure. Moreover, the method is in line with the best installation cost of air cleaning devices, the lowest required power consumption, the best operating efficiency, and the lowest noise to achieve instant cleaning processing.

SUMMARY OF THE INVENTION

[0006] One object of the present disclosure is to provide an indoor air cleaning method. An indoor air cleaning system is combined with a cloud computing service device to form a field air quality database and a suspended particulate (PM) gas bacteria virus related database, which are intelligently calculated and compared to provide reference suspended particulate (PM) air quality data and related parameters of harmful gases, bacteria, fungi, viruses and the suspended particulate matter (PM). Based on the reference suspended particulate (PM) air quality data and the related parameters of the air pollution, it determines an optimal number of the air cleaning devices and a sampling cycle to implement in the indoor field. Moreover, the actuation time period, the wind speed and noise level required for the air cleaning device to perform the cleaning process are regulated. The field air quality database further detects the air pollution data in the indoor field for verification. Thereby, the indoor air cleaning method of the present disclosure allows the gas state of the air pollution in the indoor field to reach a truly real cleanliness of clean room level

ZAPClean room 6^+, 7^+, 6, 7, 6^- or 7^-, and is in line with the best installation cost of air cleaning devices, the lowest required power consumption, the best operating efficiency, and the lowest noise to achieve instant cleaning processing.

[0007] In accordance with an aspect of the present disclosure, an indoor air cleaning method is provided, and includes steps of: a. providing an indoor air cleaning system for performing air pollution detection and cleaning treatment in an indoor field, wherein the indoor air cleaning system includes a plurality of gas detection modules for detecting air pollution in the indoor field and outputting air pollution data, and a plurality of air cleaning devices for cleaning and processing the air pollution in the indoor field; b. intelligently calculating and comparing based on a field air quality database to provide reference suspended particulate (PM) air quality data and determine a number of the air cleaning devices in the indoor field and a sampling cycle, wherein the indoor air cleaning system includes a cloud computing service device, and the cloud computing service device has the field air quality database disposed therein, collects the air pollution data detected and outputted by the plurality of gas detection modules in the plurality of air cleaning devices through communication, collects field suspended particulate (PM) air quality data in a specific field, and intelligently calculates and compares to provide the reference suspended particulate (PM) air quality data, to determine a required number of the air cleaning devices in the indoor field and the sampling cycle for the indoor air cleaning system; c. confirming whether the gas state of the air pollution in the indoor field reaches a cleanliness requirement of clean room level ZAPClean room 6^+, 7^+, 6, 7, 6^- or 7^-, wherein the cloud computing service device of the indoor air cleaning system comprises a suspended particulate (PM) gas bacteria virus related

database, which are intelligently calculated and compared to provide related parameters of harmful gases, bacteria, fungi, viruses and the suspended particulate (PM), wherein an optimal number of the air cleaning devices and a sampling cycle are determined based on the related parameters of the air pollution to implement in the indoor field, and an actuation time period, an airflow volume and a noise level required for the air cleaning devices are regulated to implement air pollution cleaning treatment, so that the gas state of the air pollution in the indoor field is confirmed through the air pollution data detected and pre-targeted by the plurality of gas detection modules, to determine whether the gas state reaches the cleanliness requirement of clean room level; d. determining the optimal number of the air cleaning devices and the sampling cycle to implement air pollution cleaning treatment, wherein if the cleanliness requirement of clean room level is reached, the optimal number of the air cleaning devices required to be disposed in the indoor field are determined and the air pollution cleaning treatment is implemented; and e. testing a verification of the air pollution data in the indoor field, and providing the verification of the air pollution data in the indoor field for a third-party testing unit to test, wherein if the cleanliness requirement of clean room level is met, the air pollution cleaning treatment is implemented based on the optimal number of the air cleaning devices and the sampling cycle obtained and determined.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] 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:

[0009] FIG. 1 is a flow chart illustrating an indoor air cleaning method according to an embodiment of the present disclosure;

[0010] FIG. 2A is a schematic perspective view illustrating the gas detection module implemented in the outdoor field or the indoor field according to the embodiment of the present disclosure according to the embodiment of the present disclosure;

[0011] FIG. 2B is a schematic perspective view illustrating the gas detection module implemented in the outdoor field or the indoor field according to the embodiment of the present disclosure and taken from another perspective;

[0012] FIG. 2C is a schematic perspective view illustrating the gas detection module according to the embodiment of the present disclosure; and

[0013] FIG. 3 is a schematic diagram illustrating a transmission relationship between the gas detection modules of the indoor air cleaning system of the present disclosure through wired communication or wireless communication;

[0014] FIG. 4A is a schematic view illustrating the indoor air cleaning method implemented in an indoor field according to an embodiment of the present disclosure;

[0015] FIG. 4B is a schematic view illustrating an indoor air cleaning method implemented in an indoor field according to another embodiment of the present disclosure;

[0016] FIG. 4C is a schematic view illustrating an indoor air cleaning method implemented in a kitchen unit of an indoor field according to an embodiment of the present disclosure;

[0017] FIG. 5A is a schematic diagram illustrating the combination of the fan and filtering element of the air cleaning device of the present disclosure; and

[0018] FIG. 5B is a schematic diagram illustrating the combination of the filtering elements of the air cleaning device of the present disclosure.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0019] 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 invention 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.

[0020] Please refer to FIG. 1. The present disclosure provides an indoor air cleaning method including the following steps.

[0021] In a step a, an indoor air cleaning system is provided for performing air pollution detection and cleaning treatment in an indoor field. In the embodiment, the indoor air cleaning system includes a plurality of gas detection modules 1 for detecting air pollution in the indoor field and outputting air pollution data of the indoor field, and a plurality of air cleaning devices 2 for cleaning and processing the air pollution in the indoor field. Notably, as shown in FIG. 3, the indoor air cleaning system mainly includes a plurality of gas detection modules 1, a plurality of air cleaning devices 2 and at least one central control and regulation device 3. Preferably but not exclusively, the gas detection module 1 is a sensing element for detecting the air pollution and disposed in the indoor field or an outdoor field for detecting the air pollution and outputting the air pollution data. Preferably but not exclusively, the air cleaning device 2 is disposed in the indoor field and includes a fan 21, a filtering element 22 and a

driving control component 23. Moreover, the gas detection module 1 is disposed within the air cleaning device 2 in electrical connection. The gas detection module 1 can detect the air pollution and output the driving power and the regulation signal. In the embodiment, the gas detection module 1 is electrically connected to the fan 21 and the driving control component 23. The gas detection module 1 detects the air pollution to output the air pollution data of the indoor field, calculates and outputs a plurality of regulation signals to an actuation operation, an airflow volume and a noise level of the fan 21, so that the fan 21 is controlled to start guiding the air pollution passing through the filtering element 22 for filtration. In the embodiment, the central control and regulation device 3 is connected to the gas detection modules 1 in the plurality of air cleaning devices 2, transmits the control command to the gas detection modules 1 through communication connection to regulate the activation operation of the fan 21, and receives the air pollution data detected by the gas detection modules 1 for displaying in real time.

[0022] In a step b, reference suspended particulate (PM) air quality data is provided by intelligently calculating and comparing based on a field air quality database. Moreover, a number of the air cleaning devices in the indoor field and a sampling cycle are determined. In the embodiment, the indoor air cleaning system includes a cloud computing service device 4, and the cloud computing service device 4 has the field air quality database disposed therein, collects the air pollution data detected and outputted by the plurality of gas detection modules 1 in the plurality of air cleaning devices 2 through communication, collects field suspended particulate (PM) air quality data in a specific field, and intelligently calculates and compares to provide the reference suspended particulate (PM) air quality data, to determine a required number of the air cleaning devices 2 in the indoor

field and the sampling cycle for the indoor air cleaning system. Notably, as shown in FIG. 2A, the indoor air cleaning system provides the cloud computing service device 4. The cloud computing service device 4 has the field air quality database disposed therein. The cloud computing service device 4 collects the air pollution data detected and outputted by the plurality of gas detection modules 1 in the plurality of air cleaning devices 2 through communication, and collects field suspended particulate (PM) air quality data in a specific field. Preferably but not exclusively, the field suspended particulate (PM) air quality data are detected in the specific field of announcement places such as hospitals, schools, libraries, etc. In that, the air pollution data detected and outputted by the plurality of gas detection modules 1 in the plurality of air cleaning devices 2 are intelligently calculated and compared based on the field suspended particulate (PM) air quality data in the specific field to provide the reference suspended particulate (PM) air quality data. The reference suspended particulate (PM) air quality data is provided for the indoor air cleaning system, to target the detection time and make the gas state of the air pollution in the indoor field reach the cleanliness of clean room level. In this way, the required number of the air cleaning devices 2 in the indoor field and the sampling cycle for the indoor air cleaning system are determined for meeting a cleanliness requirement of clean room level. That is to say, when the indoor air cleaning system is applied to the indoor field with a specific square meters, the number of the air cleaning devices 2 required for detecting and filtering and the operating cycles of the air cleaning devices 2 for instantly cleaning the indoor field are determined according to the specific square meters. It is in line with the best installation cost of air cleaning devices, the lowest required power

consumption, the best operating efficiency, and the lowest noise to achieve instant cleaning processing.

[0023] In a step c, the indoor air cleaning system confirms whether the gas state of the air pollution in the indoor field reaches a cleanliness requirement of clean room level ZAPClean room 6^+, 7^+, 6, 7, 6^- or 7^-. The cloud computing service device of the indoor air cleaning system includes a suspended particulate (PM) gas bacteria virus related database, and related parameters of harmful gases, bacteria, fungi, viruses and the suspended particulate (PM) are collected and stored in the suspended particulate (PM) gas bacteria virus related database. The suspended particulate (PM) gas bacteria virus related database is intelligently calculated and compared to provide the related parameters of harmful gases, bacteria, fungi, viruses and the suspended particulate (PM). In that, an optimal number of the air cleaning devices 2 and a sampling cycle are determined based on the related parameters of the air pollution to implement in the indoor field, and an actuation time period, an airflow volume and a noise level required for the air cleaning devices 2 are regulated to implement air pollution cleaning treatment, so that the gas state of the air pollution in the indoor field is confirmed through the air pollution data detected and pre-targeted by the plurality of gas detection modules 1, to determine whether the gas state reaches the cleanliness requirement of clean room level. Notably, the gas state of the air pollution in the indoor field includes a concentration of suspended particulate matter 2.5 (PM2.5), targeting the highest value detected in 24 hours $\leqq 0.035$ $\mu g/m^3$, so as to meet the clean room requirement of clean room level 6^+. The gas state of the air pollution in the indoor field includes a concentration of suspended particulate matter 2.5 (PM2.5), targeting the average value detected in 24 hours $\leqq 0.035$

$\mu g/m^3$, so as to meet the clean room requirement of clean room level 6. The gas state of the air pollution in the indoor field includes a concentration of suspended particulate matter 2.5 (PM2.5), targeting the median value detected in 24 hours $\leqq 0.035$ $\mu g/m^3$, so as to meet the clean room requirement of clean room level 6^-. The gas state of the air pollution in the indoor field includes a concentration of suspended particulate matter 10 (PM10), targeting the highest value, detected in 24 hours $\leqq 0.06$ $\mu g/m^3$, so as to meet the clean room requirement of clean room level 6^+. The gas state of the air pollution in the indoor field includes a concentration of suspended particulate matter 10 (PM10), targeting the average value detected in 24 hours $\leqq 0.06$ $\mu g/m^3$, so as to meet the clean room requirement of clean room level 6. The gas state of the air pollution in the indoor field includes a concentration of suspended particulate matter 10 (PM10), targeting the median value detected in 24 hours $\leqq 0.06$ $\mu g/m^3$, so as to meet the clean room requirement of clean room level 6^-. The gas state of the air pollution in the indoor field includes a concentration of formaldehyde (HCHO), targeting the highest value detected in 1 hour $\leqq$ 0.05 ppm, so as to meet the clean room requirement of clean room level 6^+. The gas state of the air pollution in the indoor field includes a concentration of formaldehyde (HCHO), targeting the average value detected in 1 hour $\leqq 0.05$ ppm, so as to meet the clean room requirement of clean room level 6. The gas state of the air pollution in the indoor field includes a concentration of formaldehyde (HCHO), targeting the median value detected in 1 hour $\leqq 0.05$ ppm, so as to meet the clean room requirement of clean room level 6^-. The gas state of the air pollution in the indoor field includes a concentration of total volatile organic compounds (TVOC), targeting the highest value detected in 1 hour $\leqq 0.45$ ppm, so as to meet

the clean room requirement of clean room level 6^{+}. The gas state of the air pollution in the indoor field includes a concentration of total volatile organic compounds (TVOC), targeting the average value detected in 1 hour $\leqq$0.45 ppm, so as to meet the clean room requirement of clean room level 6. The gas state of the air pollution in the indoor field includes a concentration of total volatile organic compounds (TVOC), targeting the median value detected in 1 hour $\leqq$0.45 ppm, so as to meet the clean room requirement of clean room level 6^{-}. The gas state of the air pollution in the indoor field A includes a concentration of suspended particulate matter 2.5 (PM2.5), targeting the highest value detected in 24 hours $\leqq$0.35 $\mu g/m^3$, so as to meet the clean room requirement of clean room level 7^{+}. The gas state of the air pollution in the indoor field includes a concentration of suspended particulate matter 2.5 (PM2.5), targeting the average value detected in 24 hours $\leqq$ 0.35 $\mu g/m^3$, so as to meet the clean room requirement of clean room level 7. The gas state of the air pollution in the indoor field includes a concentration of suspended particulate matter 2.5 (PM2.5), targeting the median value detected in 24 hours $\leqq$0.35 $\mu g/m^3$, so as to meet the clean room requirement of clean room level 7^{-}. The gas state of the air pollution in the indoor field includes a concentration of suspended particulate matter 10 (PM10), targeting the highest value, detected in 24 hours $\leqq$ 0.65 $\mu g/m^3$, so as to meet the clean room requirement of clean room level 7^{+}. The gas state of the air pollution in the indoor field includes a concentration of suspended particulate matter 10 (PM10), targeting the average value detected in 24 hours $\leqq$0.65 $\mu g/m^3$, so as to meet the clean room requirement of clean room level 7. The gas state of the air pollution in the indoor field includes a concentration of suspended particulate matter 10 (PM10), targeting the median value

detected in 24 hours $\leqq 0.65$ $\mu g/m^3$, so as to meet the clean room requirement of clean room level 7^-. The gas state of the air pollution in the indoor field includes a concentration of formaldehyde (HCHO), targeting the highest value detected in 1 hour $\leqq 0.08$ ppm, so as to meet the clean room requirement of clean room level 7^+. The gas state of the air pollution in the indoor field includes a concentration of formaldehyde (HCHO), targeting the average value detected in 1 hour $\leqq 0.08$ ppm, so as to meet the clean room requirement of clean room level 7. The gas state of the air pollution in the indoor field includes a concentration of formaldehyde (HCHO), targeting the median value detected in 1 hour $\leqq$ 0.08 ppm, so as to meet the clean room requirement of clean room level 7^-. The gas state of the air pollution in the indoor field includes a concentration of total volatile organic compounds (TVOC), targeting the highest value detected in 1 hour $\leqq 0.56$ ppm, so as to meet the clean room requirement of clean room level 7^+. The gas state of the air pollution in the indoor field includes a concentration of total volatile organic compounds (TVOC), targeting the average value detected in 1 hour $\leqq 0.56$ ppm, so as to meet the clean room requirement of clean room level 7. The gas state of the air pollution in the indoor field includes a concentration of total volatile organic compounds (TVOC), targeting the median value detected in 1 hour $\leqq 0.56$ ppm, so as to meet the clean room requirement of clean room level 7^-. The gas state of the air pollution in the indoor field includes a concentration of carbon dioxide (CO_2), targeting the highest value detected in 8 hour $\leqq 800$ ppm, so as to meet the clean room requirement of clean room level 6^+, 7^+. The gas state of the air pollution in the indoor field includes a concentration of carbon dioxide (CO_2), targeting the average value detected in 8 hour $\leqq 800$ ppm, so as to meet the clean room

requirement of clean room level 6, 7. The gas state of the air pollution in the indoor field includes a concentration of carbon dioxide (CO_2), targeting the median value detected in 8 hour $\leqq$800 ppm, so as to meet the clean room requirement of clean room level 6^-, 7^-. The gas state of the air pollution in the indoor field includes a concentration of carbon monoxide (CO), targeting the highest value detected in 8 hour $\leqq$9 ppm, so as to meet the clean room requirement of clean room level 6^+, 7^+. The gas state of the air pollution in the indoor field includes a concentration of carbon monoxide (CO), targeting the average value detected in 8 hour $\leqq$9 ppm, so as to meet the clean room requirement of clean room level 6, 7. The gas state of the air pollution in the indoor field includes a concentration of carbon monoxide (CO), targeting the median value detected in 8 hour $\leqq$9 ppm, so as to meet the clean room requirement of clean room level 6^-, 7^-. The gas state of the air pollution in the indoor field includes a concentration of ozone (O_3), targeting the highest value detected in 8 hour $\leqq$0.06 ppm, so as to meet the clean room requirement of clean room level 6^+, 7^+. The gas state of the air pollution in the indoor field includes a concentration of ozone (O_3), targeting the average value detected in 8 hour $\leqq$0.06 ppm, so as to meet the clean room requirement of clean room level 6, 7. The gas state of the air pollution in the indoor field includes a concentration of ozone (O_3), targeting the median value detected in 8 hour $\leqq$0.06 ppm, so as to meet the clean room requirement of clean room level 6^-, 7^-. The gas state of the air pollution in the indoor field includes a colony-forming unit of bacteria, targeting the highest value, detected in 24 hours $\leqq$10 CFU/m^3, so as to meet the clean room requirement of clean room level 6^+. The gas state of the air pollution in the indoor field includes a colony-forming unit of bacteria, targeting the average value detected in 24 hours $\leqq$10 CFU/m^3,

so as to meet the clean room requirement of clean room level 6. The gas state of the air pollution in the indoor field includes a colony-forming unit of bacteria, targeting the median value detected in 24 hours $\leqq$10 CFU/m^3, so as to meet the clean room requirement of clean room level 6^-. The gas state of the air pollution in the indoor field includes a colony-forming unit of fungus, targeting the highest value, detected in 24 hours $\leqq$10 CFU/m^3, so as to meet the clean room requirement of clean room level 6^+. The gas state of the air pollution in the indoor field includes a colony-forming unit of fungus, targeting the average value detected in 24 hours $\leqq$10 CFU/m^3, so as to meet the clean room requirement of clean room level 6. The gas state of the air pollution in the indoor field includes a colony-forming unit of fungus, targeting the median value detected in 24 hours $\leqq$10 CFU/m^3, so as to meet the clean room requirement of clean room level 6^-. The gas state of the air pollution in the indoor field includes a colony-forming unit of bacteria, targeting the highest value, detected in 24 hours $\leqq$200 CFU/m^3, so as to meet the clean room requirement of clean room level 7^+. The gas state of the air pollution in the indoor field includes a colony-forming unit of bacteria, targeting the average value detected in 24 hours $\leqq$200 CFU/m^3, so as to meet the clean room requirement of clean room level 7. The gas state of the air pollution in the indoor field includes a colony-forming unit of bacteria, targeting the median value detected in 24 hours $\leqq$200 CFU/m^3, so as to meet the clean room requirement of clean room level 7^-. The gas state of the air pollution in the indoor field includes a colony-forming unit of fungus, targeting the highest value, detected in 24 hours $\leqq$200 CFU/m^3, so as to meet the clean room requirement of clean room level 7^+. The gas state of the air pollution in the indoor field includes a colony-forming unit of fungus, targeting the

average value detected in 24 hours ≦200 CFU/m^3, so as to meet the clean room requirement of clean room level 7. The gas state of the air pollution in the indoor field includes a colony-forming unit of fungus, targeting the median value detected in 24 hours ≦200 CFU/m^3, so as to meet the clean room requirement of clean room level 7^-. Notably, if the gas state of the air pollution status in the indoor field does not reach the cleanliness requirement of clean room level ZAPClean room 6^+, 7^+, 6, 7, 6^- or 7^-in the step c, the steps go back to the step a for performing air pollution detection and cleaning treatment in the indoor field, and the step b for providing the reference suspended particulate (PM) air quality data to determine the required number of the air cleaning devices in the indoor field and the sampling cycle until the cleanliness requirement of clean room level ZAPClean room 6^+, 7^+, 6, 7, 6^- or 7^- is reached, and then a step d is continued for determining the optimal number of the air cleaning devices 2 and the sampling cycle to implement the air pollution cleaning treatment.

[0024] In the step d, the optimal number of the air cleaning devices 2 and the sampling cycle are determined to implement air pollution cleaning treatment. If the cleanliness requirement of clean room level is reached, the optimal number of the air cleaning devices 2 required to be disposed in the indoor field are determined and the air pollution cleaning treatment is implemented.

[0025] In a step e, a verification of the air pollution data in the indoor field is tested, and the verification of the air pollution data in the indoor field is provided for a third-party testing unit to detect. If the cleanliness requirement of clean room level is met, the air pollution cleaning treatment is implemented based on the optimal number of the air cleaning devices 2 and the sampling cycle obtained and determined. Notably, if the

verification of the air pollution data in the indoor field does not reach the cleanliness requirement of clean room level in the step e, the steps go back to the step a to the step d for readjusting and determining the optimal number of the air cleaning devices 2 and the sampling cycle for verification until the gas state of the air pollution in the indoor field meeting the cleanliness requirement of clean room level ZAPClean room 6^+, 7^+, 6, 7, 6^- or 7^- is verified.

[0026] From the above, the present disclosure provides an indoor air cleaning method. An indoor air cleaning system determines the number of the air cleaning devices 2 required to be installed in the indoor field and the sampling cycles for performing air pollution detection and coordinating regulation operations, and the verification of the air pollution data of the indoor field is tested. Thereby, the indoor air cleaning method of the present disclosure allows the gas state of the air pollution in the indoor field to reach a truly real cleanliness of clean room level ZAPClean room 6^+, 7^+, 6, 7, 6^- or 7^-, and is in line with the best installation cost of air cleaning devices, the lowest required power consumption, the best operating efficiency, and the lowest noise to achieve instant cleaning processing.

[0027] After understanding the above-mentioned indoor air cleaning method, it is described that the relevant devices of the present disclosure are used to implement air pollution detection and coordinate regulation operations for cleaning and processing the air pollution.

[0028] Please refer to FIG. 2A and FIG. 2B. The gas detection module 1 can be composed of a type including an external power terminal, and the external power terminal is directly inserted into the power interface of the indoor field or the outdoor field, so as to start operation of detecting the air pollution. Alternatively, as shown in FIG. 2C, the gas detection module doesn’t include an external power terminal, and is directly disposed

within the air cleaning device 2 in electrical connection (e.g., the gas detection module shown in FIG. 3A).

[0029] In the embodiment, the gas detection module 1 is a sensing element for detecting the air pollution, and includes a particle sensing element, a temperature and humidity sensing element, a gas sensing element, a bacteria sensing element, a fungus sensing element and a virus sensing element.

[0030] The above-mentioned particle sensing element detects the air pollution data of suspended particles contained in the air. The suspended particles refer to suspended particles (PM1, PM2.5, PM10) contained in the air, acetamide, acetonitrile, acetophenone, 2-acetylaminofluorene, acrolein, acrylamide, acrylic acid, acrylonitrile, propylene chloride, 4-aminobiphenyl, aniline, o-anisidine, asbestos, benzidine, biphenyl, di(2-ethylhexyl) phthalate (DEHP), dichloromethyl ether, 1,3-butadiene, calcium cyanamide, caprolactam, captan, carbaryl, catechol, chloramben, chlordane, chloroacetic acid, 2-chloroacetophenone, chlorobenzilate, chloromethyl methyl ether, cresol/methanesulfonic acid (isomers and mixtures), o-cresol, m-cresol, p-cresol, cumene, 2,4-dichlorophenoxyacetic acid, salts and esters, 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, dimethylcarbamate chloride, dimethylformamide, 1,1-dimethylhydrazine, dimethyl phthalate, dimethyl sulfate, 4,6-dinitro-o-cresol and its salts, 2,4-dinitrophenol, 2,4-dinitrotoluene, 1,4-dioxane (1,4-ethylene dioxide), 1,2-diphenylhydrazine, epichlorohydrin (1-chloro-2,3-epoxy propane), 1,2-butylene oxide, ethyl acrylate, ethyl urethane (ethyl carbamate),

ethylene glycol, ethyleneimine (azirine), 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'-aminodiphenylmethane, naphthalene, nitrobenzene, 4-Nitrobiphenyl, 4-nitrophenol, 2-nitropropane, N-nitroso-N-methyl urea, N-nitroso dimethylamine, N-nitroso morpholine, 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-propylene imine (2-methylaziridine), quinoline, quinone, styrene, styrene oxide, 2,3,7,8-tetrachlorodibenzo-p-dioxin, titanium tetrachloride, ~~toluene,~~ 2,4-toluenediamine, 2,4-toluene diisocyanate, o-toluidine, toxaphene (camphene chloride), 2,4,5-trichlorophenol, 2,4,6-trichlorophenol, triethylamine, trifluralin, 2,2,4-trimethylpentane, vinyl acetate, bromine ethylene, 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, radioactive nuclides, selenium compounds.

[0031] The above-mentioned temperature and humidity sensing element detects the air pollution data of the temperature and humidity of the air. The gas sensing element detects the air pollution data of gas molecules contained in the air. The gas molecules can be for example but

not limited to ozone, carbon monoxide, carbon dioxide, sulfur dioxide, acetaldehyde, benzene, trichlorotoluene, benzyl chloride, bromoform, 1-bromopropane, carbon disulfide, carbon tetrachloride, carbonyl sulfide, chlorine, chlorobenzene, chloroform, chloroprene diene, diazomethane, 1,2-dibromo-3-chloropropane, ethylbenzene, ethyl chloride, dibromoethane, dichloroethane (1,2-dichloroethane), dichloroethane (1,1-dichloroethane), formaldehyde, heptachlor, hexachlorobenzene, hexachloroethane, hexane, hydrochloric acid, hydrogen fluoride (hydrofluoric acid), hydrogen sulfide, methanol, potassium chloride alcohol, methyl bromide (Methyl bromide), methyl chloride (methyl chloride), methyl chloroform (1,1,1-trichloroethane), methyl ethyl ketone (2-butanone), methyl iodide (methyl iodide), methylene chloride, phosgene, propylene Aldehydes, 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 ether, radon and so on.

[0032] In the embodiment, the cloud computing service device 4 receives signals of the air pollution data detected and outputted by the gas detection modules 1 in the plurality of air cleaning devices 2 through communication. Preferably but not exclusively, the cloud computing service device 4 receives signals of the air pollution data, which are detected and outputted by the gas detection modules 1 in the plurality of air cleaning devices 2 through wireless communication of a router 5, and stored to form a database of the air pollution data. The cloud computing service device 4 intelligently computes and compares based on the air pollution data, and intelligently selects and issues a control command through wireless communication of the router 5. The control command is transmitted to the gas detection modules 1 in the plurality of air cleaning

devices 2 for receiving, and then transmitted to the driving control component 23 to regulate the activation operation of the fan 21. In that, the fan 21 is controlled to start guiding the air pollution passing through the filtering element 22 for filtration. Alternatively, the cloud computing service device 4 is connected to central control and regulation device 3 through wired communication of a router 5 to receive the air pollution data signal, and the central control and regulation device 3 transmits the signals of the air pollution data through wireless communication. The signals of the air pollution data are received by a router 5, and then the air pollution data signal is received and transmitted through the router 5 to the cloud computing service device 4 for storage to form a database of the air pollution data. Moreover, the cloud computing service device 4 intelligently computes and compares based on the air pollution data, and intelligently selects and issues a control command through wired communication of the router 5. The control command is transmitted to the gas detection modules 1 in the plurality of air cleaning devices 2 for receiving, and then transmitted to the driving control component 23 to regulate the activation operation of the fan 21. In that, the fan 21 is controlled to start guiding the air pollution passing through the filtering element 22 for filtration.

[0033] In addition, the plurality of gas detection modules 1 in the plurality of air cleaning devices 2 are connected to the central control and regulation device 3 under the handshake communication protocol of the wired communication or the wireless communication. When the wireless communication or the wired communication is disconnected, it allows to regulate and select an activation mechanism with the wired communication or the wireless communication that can operate transmission. In that, the cloud computing service device 4 receives the air pollution data through the

activation mechanism with the wired communication or the wireless communication that can operate the transmission, intelligently computes and compares based on the air pollution data, and then intelligently selects and issues the control command to be transmitted to the gas detection modules 1 in the plurality of air cleaning devices 2 for receiving under the connection of the activation mechanism with the wired communication or the wireless communication that can operate transmission, and then the control command is transmitted to the driving control component 23 to regulate the activation operation of the fan 21. The fan 21 is controlled to start guiding the air pollution passing through the filtering element 22 for filtration, so that the gas state in the indoor field reaches the cleanliness requirement of clean room level ZAPClean room 6^+, 7^+, 6, 7, 6^- or 7^-. Alternatively, the plurality of gas detection modules 1 in the plurality of air cleaning devices 2 are connected to the central control and regulation device 3 under the handshake communication protocol of the wired communication or the wireless communication. When the wireless communication and the wired communication are both disconnected, it allows to autonomously compute and compare the air pollution data outputted by the gas detection modules based on the air pollution data, and then transmit the control command to the driving control component 23 to regulate the activation operation of the fan 21. The fan 21 is controlled to start guiding the air pollution passing through the filtering element 22 for filtration, so that the gas state in the indoor field reaches the cleanliness requirement of clean room level ZAPClean room 6^+, 7^+, 6, 7, 6^- or 7^-.

[0034] As shown in FIG. 4A and FIG. 4B. the specific implementation of the indoor air cleaning system in the indoor field A according to the present disclosure can be understood. The specific implementation of the plurality of air cleaning devices 2 in the indoor field

A will be described below. The air cleaning device 2 can be installed in the indoor field A through a built-in or plug-in manner. If the air cleaning device 2 is installed in the indoor field A through the built-in manner (as shown in FIG. 4A and FIG. 4B), at least one circulation back-flow channel C is disposed within the indoor field A. The at least one circulation back-flow channel C is surrounded and isolated by several partitions C1 to form on a side of the indoor field A, and includes a plurality of air intakes C2 and a plurality of back-flow vents C3.

[0035] Preferably but not exclusively, the air cleaning device 2 is a gas exchanger 2a, and the gas exchanger 2a is disposed in the circulation back-flow channel C of the indoor field A and corresponding to the air intake C2. Moreover, there is a communication channel (not shown) for implementing ventilation with the outdoor field B. The gas detection module 1 in the gas exchanger 2a receives the control command through the wireless communication or the wired communication, and transmits the control command to the driving control component 23 to regulate the activation operation of the fan 21. Furthermore, 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 for detecting the air pollution. The cloud computing service device 4 receives the air pollution data of the indoor field A and the outdoor field B for storing to form a database of the air pollution data, and intelligently computes and compares the air pollution data of the indoor field A and the outdoor field B. When the air pollution data of the indoor field A is greater than the air pollution data of the outdoor field B, the cloud computing service device 4 issues the control command to be transmitted to the gas detection module 1 in the gas exchanger 2a through wireless communication or wired communication for receiving, and then the control command is transmitted to the driving

control component 23 to regulate the activation operation of the fan 21, so that it allows to introduce gas from the outdoor field B into the indoor field A for ventilation. Notably, in the embodiment, the air pollution data detected by the gas detection modules 1 of the outdoor field B and the indoor field A are the air pollution data of carbon dioxide (CO_2), and the air pollution data of carbon dioxide (CO_2) have to be maintained below a pollution threshold safety value of 800 ppm, so that the gas exchanger 2a introduces the gas from the outdoor field B into the indoor field A for ventilation when the air pollution data of carbon dioxide (CO_2) exceeds the pollution threshold safety value. Notably, in the embodiment, the gas exchanger 2a can be example but not limited to a fresh air fan or a complete heat exchanger.

[0036] Preferably but not exclusively, in the embodiment, the air cleaning device 2 is a circulation filter device 2b, and the circulation filter device 2b is disposed in the circulation back-flow channel C of the indoor field A and corresponding to the air intake C2. The air pollution is filtered through the filtering element 22, discharged through the air intake C2, and then entering the space of the indoor field A. The gas detection module 1 in the circulation filter device 2b transmits the air pollution data externally to the cloud computing service device 4 through wireless communication or wired communication for receiving to form a database of the air pollution data. The cloud computing service device 4 intelligently computes and compares the air pollution data, and intelligently selects and issues the control command to be transmitted to the gas detection module 1 through the wireless communication or the wired communication for receiving, and then the control command is transmitted to the driving control component 23 to regulate the activation operation of the fan 21 of the circulation filter device 2b. In that, the air pollution is guided to pass

through the filtering element 22 for filtering and entering space of the indoor field A, so that the gas state in the indoor field A reaches one targeted based on a detection time to meet the clean room requirement.

[0037] Please refer to FIG. 4A, FIG. 4B and FIG. 4C. Preferably but not exclusively, in the embodiment, the air cleaning device 2 is a negative pressure exhaust fan 2c, and the negative pressure exhaust fan 2c is disposed in a kitchen unit A1 of the indoor field A. Moreover, the negative pressure exhaust fan 2c is disposed in the circulation back-flow channel C of the indoor field A, and has a communication channel (not shown) in communication with the outdoor field B for discharging the air pollution from the indoor field A to the outdoor field B at an accelerated rate. The gas detection module 1 in the negative pressure exhaust fan 2c transmits the air pollution data externally to the cloud computing service device 4 through wireless communication or wired communication for receiving to form the database of the air pollution data, and the cloud computing service device 4 intelligently computes and compares the air pollution data, and intelligently selects and issues the control command to be transmitted to the gas detection module 1 through the wireless communication or the wired communication for receiving. Then, the control command is transmitted to the driving control component 23 to regulate the activation operation of the negative pressure exhaust fan 2c. In that, the air pollution is guided to pass through the filtering element 22 for filtration, and the air pollution in the indoor field A is discharged to the outdoor field B at an accelerated rate. Notably, in the embodiment, the negative pressure exhaust fan 2c is installed in front of the cooking equipment D to directly suck out the air pollution, so that the cook cannot smell the oil smoke, and it prevents the air pollution from spreading to

other spaces, such as the living room, but the present disclosure is not limited thereto.

[0038] Please refer to FIG. 4A, FIG. 4B and FIG. 4C. Preferably but not exclusively, in the embodiment, the air cleaning device 2 is a hood exchanger 2d, and the hood exchanger 2d is disposed in a kitchen unit A1 of the indoor field A. Moreover, the hood exchanger 2d is disposed in the circulation back-flow channel C of the indoor field A, and has a communication channel (not shown) in communication with the outdoor field B for discharging the air pollution from the indoor field A to the outdoor field B at an accelerated rate. In the embodiment, the gas detection module 1 in the hood exchanger 2d transmits the air pollution data externally to the cloud computing service device 4 through wireless communication or wired communication for receiving to form a database of the air pollution data. Moreover, the cloud computing service device 4 intelligently computes and compares the air pollution data, and intelligently selects and issues the control command to be transmitted to the gas detection module 1 through the wireless communication or the wired communication for receiving. Then, the control command is transmitted to the driving control component 23 to regulate the activation operation of the fan 21 of the hood exchanger 2d. In that, the air pollution is guided to pass through the filtering element 22 for filtration, and the air pollution in the indoor field A is discharged to the outdoor field B at an accelerated rate.

[0039] Preferably but not exclusively, in the embodiment, the air cleaning device 2 is a bathroom exhaust fan 2e, and the bathroom exhaust fan 2e is disposed in a bathroom unit A2 of the indoor field A. Moreover, the bathroom exhaust fan 2e is disposed in the circulation back-flow channel C of the indoor field A, and has a communication channel (not shown) in communication with the outdoor field B for discharging the air

pollution from the indoor field A to the outdoor field B at an accelerated rate. The gas detection module 1 in the bathroom exhaust fan 2e transmits the air pollution data externally to a cloud computing service device 4 through wireless communication or wired communication for receiving to form a database of the air pollution data. The cloud computing service device 4 intelligently computes and compares the air pollution data, and intelligently selects and issues the control command to be transmitted to the gas detection module 1 through the wireless communication or the wired communication for receiving. Then, the control command is transmitted to the driving control component 23 to regulate the activation operation of the fan 21 of the bathroom exhaust fan 2e. In that, the air pollution is guided to pass through the filtering element 22 for filtration, and the air pollution in the indoor field A is discharged to an outdoor field B at an accelerated rate. At same time, the bathroom unit A2 of the indoor field A is allowed to implement a temperature and humidity control. Preferably but not exclusively, the temperature and humidity control is implemented to maintain a temperature of 25°C±3°C and a humidity of 50%±10% in the bathroom unit A2 of the indoor field A.

[0040] Please refer to FIG. 5A and FIG. 5B. In the above embodiments, the fan 21 of the air cleaning device 2 is controlled and enabled to guide the air pollution to pass through the filtering element 22 for filtration. Preferably but not exclusively, in an embodiment, the filtering element 22 is an ultra-low particulate air (ULPA) filter, a high efficiency particulate air (HEPA) filter or a combination thereof, which is configured to absorb the chemical smoke, the bacteria, the dust particles and the pollen contained in the air pollution, so that the air pollution introduced into the filtering element 22 is filtered and purified to achieve the effect of filtering and purification.

[0041] In the embodiment, the filtering element 22 of the present disclosure is further combined with physical or chemical materials to provide a sterilization effect on the air pollution, and the airflow of the fan 21 flows in the path indicated by the arrow. As shown in FIG. 5B, in the embodiment, the filtering element 22 includes a decomposition layer coated thereon to sterilize in chemical means. Preferably but not exclusively, the decomposition layer includes an activated carbon 22a configured to remove organic and inorganic substances in air pollution, and remove colored and odorous substances. Preferably but not exclusively, the decomposition layer includes a cleansing factor containing chlorine dioxide layer 22b 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 22c 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 22d configured to inhibit viruses, bacteria and fungi contained in the air pollution. Preferably but not exclusively, the decomposition layer includes a zeolite 22e configured to remove ammonia nitrogen, heavy metals, organic pollutants, Escherichia coli, phenol, chloroform and anionic surfactants.

[0042] Furthermore, in some embodiments, the filtering 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 22f and an ultraviolet lamp 22g. When the photo catalyst 22f is irradiated by the ultraviolet lamp 22g,

the light energy is converted into the chemical energy, thereby decomposes harmful gases and disinfects bacteria contained in the air pollution, so as to achieve the effects of filtering and purifying. Preferably but not exclusively, the light irradiation element is a photo-plasma unit including a nanometer irradiation tube 22h. When the introduced air pollution is irradiated by the nanometer irradiation tube 22h, 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 filtering and purifying. Notably, in the embodiment, the air cleaning device 2 further includes an ultraviolet lamp component configured to control starting and regulation of the ultraviolet lamp 22g. Preferably but not exclusively, the ultraviolet lamp 22g is arranged on one side of the filtering element 22 for sterilizing the air pollution.

[0043] Moreover, in some embodiments, the filtering 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 22i with a dust collecting plate. It makes the suspended particles in the air pollution to carry with positive charge and adhered to the dust collecting plate carry with negative charges, so as to achieve the effects of filtering and purifying. Preferably but not exclusively, the decomposition unit is a plasma ion unit 22j. The oxygen molecules and water molecules contained in the air pollution are decomposed into positive hydrogen ions (H^+) and negative oxygen ions (O^{2-}) by the plasma ion. The substances attached with water around the ions are adhered on the surface of viruses and bacteria and converted into OH radicals with extremely strong

oxidizing power, thereby removing hydrogen (H) from the protein on the surface 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 purifying.

[0044] From the above, the present disclosure provides an indoor air cleaning system. In the specific implementation, the gas detection module 1 is installed on each indoor air cleaning device 2 for detecting the air pollution detection, transmitting the air pollution data, and receiving the control command to electrically connect the driving control component 23 of the air cleaning device 2. The driving control component 23 regulates the activation operation of the fan 21 of the air cleaning device 2, and allows receiving the air pollution data outputted from the gas detection module 1 and transmitted through the wireless communication or the wired communication. Since the communication transmission can be achieved by using the wireless communication or the wired communication, the dual methods of the wired communication and the wireless communication are selected to implement an operable transmission communication mechanism, and a monitoring mechanism is cooperated under the handshake communication protocol of wired communication and wireless communication. An activation mechanism of the wired communication that can operate the transmission or the wireless communication that can operate the transmission is selected through an autonomous judgment for implementing. Thereby, the air pollution data outputted through detecting the air pollution are transmitted to the cloud computing service device 4 through the activation mechanism. Then, the cloud computing service device 4 generates the control command, which is fed back to the gas detection module 1 and transmitted to the driving control component 23 electrically connected. The driving control component 23 regulates the

activation operation of the fan 21 of the air cleaning device 2, so that a prevention mechanism of detecting the disconnection of the wireless communication or the wired communication is achieved. In addition, when the gas detection module detects that the wireless communication and the wired communication for outputting the air pollution data are both disconnected, it allows to autonomously compute and compare the air pollution data outputted by the gas detection module 1 based on the air pollution data, and then transmit the control command to the driving control component 23 of the air cleaning device 2 to regulate the activation operation of the fan 21. Consequently, the fan 21 is controlled to start guiding the air pollution passing through the filtering element 22 for filtration, so that the gas state in the indoor field A reaches one targeted based on a detection time to meet the clean room requirement.

[0045] Moreover, in the indoor air cleaning system of the present disclosure, the cloud computing service device 4 receives the air pollution data of the indoor field A and the outdoor field B through the wireless communication or the wired communication for storing to form a database of the air pollution data. The intelligent computing comparison based on the database of the air pollution data is performed to intelligently select and output the control command to the fan 21 of the air cleaning device 2 for actuation and regulation operation. Whereby, the fan 21 of the air cleaning device 2 generates an internal circulation directional airflow continuously in the indoor field A, and the air pollution is guided to pass through the filtering element 22 multiple times for filtration. In other words, the cloud computing service device 4 intelligently computes the cleanliness according to the number of suspended particles passing through the indoor field A in real time, intelligently selects and issues the control command to be transmitted to the plurality of the air cleaning devices 2,

and timely adjusts and controls the fan 21 of the air cleaning device 2 for actuation, so as to randomly change and adjust the airflow volume and the actuation time period based on the cleanliness of the number of suspended particles in real time. Whereby, the cleaning efficiency of the indoor field A is improved, the environmental noise of the indoor field A is reduced, the internal circulation directional airflow is generated in the indoor field A to generate, and the air pollution is guided to pass through the filtering element 22 multiple times for filtration, so that the gas state of the air pollution in the indoor field A reaches the air pollution data targeted based on a detection time, to meet the cleanliness requirement of clean room level ZAPClean room 6^{+}, 7^{+}, 6, 7, 6^{-} or 7^{-}.

[0046] The above clean room requirement allows to reach a cleanliness of ZAPClean Room 1~9, which is similar to the ISO standard clean room ISO 1~9. However, the cleanliness of ZAPClean Room 1~9 is a technical structure different from the traditional clean room ISO 1~9, but able to achieve the same indoor air cleanliness as the traditional clean room ISO 1~9. Generally, the cleanliness of the traditional clean room ISO 1~9 is not equipped with sensors for real-time detection around the clock, so the system need to be operated at high speed 24 hours a day. This way of operating will result in a large amount of energy loss and a high-noise environment. Such a system cannot be used in ordinary indoor home life. General home environment standards are in compliance with the cleanliness of ZAPClean Room 6^{+}, 6, 6^{-} and the cleanliness of ZAPClean Room 7^{+}, 7, 7^{-} in the present disclosure. The cleanliness of ZAPClean Room 6^{+}, 6, 6^{-} is the same as the cleanliness of clean room ISO 6. The cleanliness of ZAPClean Room 7^{+}, 7, 7^{-} is the same as the cleanliness of clean room ISO 7.

[0047] The indoor air cleaning system of the present disclosure allows to reach the cleanliness of ZAPClean Room 6^+, 6, 6^- and the cleanliness of ZAPClean Room 7^+, 7, 7^-. The indoor air cleaning system of the present disclosure utilizes the plurality of air cleaning devices (such as the gas exchanger 2a, the circulation filter device 2b, the negative pressure exhaust fan 2c, the hood exchanger 2d and the bathroom exhaust fan 2e) with the gas detection module and the cloud computing service device disposed therein to form an intelligent linkage system. The external and built-in gas detection modules are used to detect PM2.5 concentration/particle number, carbon dioxide (CO_2), carbon monoxide (CO), formaldehyde, volatile organic compounds (TVOC), ozone (O_3), bacteria and fungi. It allows connecting to the cloud computing service device through wired communication or wireless communication for intelligently computing and selecting so that the control instruction signals are provided for the gas detection modules in the plurality of air cleaning devices regulating the activation operations, the air volume and the noise thereof, thereby achieving the ZAPClean room system that operates silently and efficiently.

[0048] In summary, the present disclosure provides an indoor air cleaning method. An indoor air cleaning system is combined with a cloud computing service device to form a field air quality database and a suspended particulate (PM) gas bacteria virus related database, which are intelligently calculated and compared to provide reference suspended particulate (PM) air quality data and related parameters of harmful gases, bacteria, fungi, viruses and the suspended particulate matter (PM). Based on the reference suspended particulate (PM) air quality data and the related parameters of the air pollution, it determines an optimal number of the air cleaning devices and a sampling cycle to implement in the indoor field.

Moreover, the actuation time period, the wind speed and noise level required for the air cleaning device to perform the cleaning process are regulated. The field air quality database further detects the air pollution data in the indoor field for verification. Thereby, the indoor air cleaning method of the present disclosure allows the gas state of the air pollution in the indoor field to reach a truly real cleanliness of clean room level ZAPClean room 6^{+}, 7^{+}, 6, 7, 6^{-} or 7^{-}, and is in line with the best installation cost of air cleaning devices, the lowest required power consumption, the best operating efficiency, and the lowest noise to achieve instant cleaning processing. The present disclosure includes the industrial applicability and the inventive steps.

WHAT IS CLAIMED IS:

1. An indoor air cleaning method, comprising steps of:

a. providing an indoor air cleaning system for performing air pollution detection and cleaning treatment in an indoor field, wherein the indoor air cleaning system comprises a plurality of gas detection modules for detecting air pollution in the indoor field and outputting air pollution data, and a plurality of air cleaning devices for cleaning and processing the air pollution in the indoor field;

b. intelligently calculating and comparing based on a field air quality database to provide reference suspended particulate (PM) air quality data and determine a number of the air cleaning devices in the indoor field and a sampling cycle, wherein the indoor air cleaning system comprises a cloud computing service device, and the cloud computing service device has the field air quality database disposed therein, collects the air pollution data detected and outputted by the plurality of gas detection modules in the plurality of air cleaning devices through communication, collects field suspended particulate (PM) air quality data in a specific field, and intelligently calculates and compares to provide the reference suspended particulate (PM) air quality data, to determine a required number of the air cleaning devices in the indoor field and the sampling cycle for the indoor air cleaning system;

c. confirming whether the gas state of the air pollution in the indoor field reaches a cleanliness requirement of clean room level ZAPClean room 6^{+}, 7^{+}, 6, 7, 6^{-} or 7^{-}, wherein the cloud computing service device of the indoor air cleaning system comprises a suspended particulate (PM) gas bacteria virus related database, which are intelligently calculated and compared to provide related parameters of harmful gases, bacteria, fungi, viruses and the suspended particulate (PM), wherein an optimal number of the air cleaning

devices and a sampling cycle are determined based on the related parameters of the air pollution to implement in the indoor field, and an actuation time period, an airflow volume and a noise level required for the air cleaning devices are regulated to implement air pollution cleaning treatment, so that the gas state of the air pollution in the indoor field is confirmed through the air pollution data detected and pre-targeted by the plurality of gas detection modules, to determine whether the gas state reaches the cleanliness requirement of clean room level;

d. determining the optimal number of the air cleaning devices and the sampling cycle to implement air pollution cleaning treatment, wherein if the cleanliness requirement of clean room level is reached, the optimal number of the air cleaning devices required to be disposed in the indoor field are determined and the air pollution cleaning treatment is implemented; and

e. testing a verification of the air pollution data in the indoor field, and providing the verification of the air pollution data in the indoor field for a third-party testing unit to test, wherein if the cleanliness requirement of clean room level is met, the air pollution cleaning treatment is implemented based on the optimal number of the air cleaning devices and the sampling cycle obtained and determined.

2. The indoor air cleaning method according to claim 1, wherein if the gas state of the air pollution status in the indoor field does not reach the cleanliness requirement of clean room level ZAPClean room 6^{+}, 7^{+}, 6, 7, 6^{-} or 7^{-}in the step c, the steps go back to the step a for performing air pollution detection and cleaning treatment in the indoor field, and the step b for providing the reference suspended particulate (PM) air quality data to determine the required number of the air cleaning devices in the indoor field and the sampling cycle until the cleanliness requirement of clean room

level ZAPClean room 6^+, 7^+, 6, 7, 6^- or 7^- is reached, and then the step d is continued for determining the optimal number of the air cleaning devices and the sampling cycle to implement the air pollution cleaning treatment.

3. The indoor air cleaning method according to claim 1, wherein if the verification of the air pollution data in the indoor field does not reach the cleanliness requirement of clean room level in the step e, the steps go back to the step a to the step d readjusting and determining the optimal number of the air cleaning devices and the sampling cycle for verification until the gas state of the air pollution in the indoor field meeting the cleanliness requirement of clean room level ZAPClean room 6^+, 7^+, 6, 7, 6^- or 7^- is verified.

4. The indoor air cleaning method according to claim 1, wherein the gas detection module is a sensing element for detecting the air pollution, and includes a particle sensing element, a temperature and humidity sensing element, a gas sensing element, a bacteria sensing element, a fungus sensing element or a virus sensing element for detecting the air pollution data of suspended particles contained in air, the air pollution data of gas molecules contained in air, the air pollution data of temperature and humidity, the air pollution data of bacteria contained in air, the air pollution data of fungus contained in air, or the air pollution data of virus contained in air respectively.

5. The indoor air cleaning method according to claim 1, wherein the indoor air cleaning system comprises at least one at least one central control and regulation device, and the plurality of gas detection modules detect the air pollution and output the air pollution data, which are calculated and processed to output a plurality of regulation signals, wherein each of the plurality of air cleaning devices comprises a fan, a filtering element and a driving control component, wherein the plurality of gas detection modules

are disposed within the plurality of air cleaning devices, and electrically connected to the fan and the driving control component, wherein the driving control component regulates an activation operation, an airflow volume and a noise level of the fan according to the plurality of regulation signals received, and the fan is controlled to start guiding the air pollution passing through the filtering element for filtration, wherein the central control and regulation device is connected with the plurality of gas detection modules in the plurality of air cleaning devices, wherein the at least one central control and regulation device is connected under handshake communication protocol of wired communication or wireless communication to provide an control instruction signal to the gas detection module for regulating operations of the fans of the plurality of air cleaning devices, and receives the air pollution data detected by the gas detection modules for displaying in real time.

6. The indoor air cleaning method according to claim 5, wherein the cloud computing service device receives signals of the air pollution data, which are detected and outputted by the gas detection modules in the plurality of air cleaning devices through wireless communication of a router, and stored to form a database of the air pollution data, wherein the cloud computing service device intelligently computes and compares based on the air pollution data, wherein the control command is intelligently selected and issued through wireless communication of the router, transmitted to the gas detection modules in the plurality of air cleaning devices for receiving, then transmitted to the driving control component to regulate the activation operation of the fan, wherein the fan is controlled to start guiding the air pollution passing through the filtering element for filtration, so that the gas state in the indoor field reaches the cleanliness requirement of clean room level ZAPClean room 6^{+}, 7^{+}, 6, 7, 6^{-} or 7^{-}.

7. The indoor air cleaning method according to claim 5, wherein the gas detection modules in the plurality of air cleaning devices are connected to the central control and regulation device through wired communication to receive the signals of the air pollution data, the central control and regulation device transmits the signals of the air pollution data to the router for receiving through wireless communication, and then the signals of the air pollution data are received by the router and transmitted to the cloud computing service device, so as to be stored to form the database of the air pollution data, wherein the cloud computing service device intelligently computes and compares based on the air pollution data, the control command is intelligently selected and issued to the central control and regulation device for communication connection, and then the control command is transmitted by the central control and regulation device to the gas detection modules in the plurality of air cleaning devices through wired communication connection for receiving, and then transmitted to the driving control component to regulate the activation operation of the fan, wherein the fan is controlled to start guiding the air pollution passing through the filtering element for filtration, so that the gas state in the indoor field reaches the cleanliness requirement of clean room level ZAPClean room 6^{+}, 7^{+}, 6, 7, 6^{-} or 7^{-}.

8. The indoor air cleaning method according to claim 5, wherein the gas detection modules in the plurality of air cleaning devices are connected to the central control and regulation device under handshake communication protocol of wired communication or wireless communication, wherein when the wireless communication or the wired communication is disconnected, it allows to regulate and select an activation mechanism with the wired communication or the wireless communication that can operate transmission, wherein the cloud computing service device receives the air

pollution data through the activation mechanism with the wired communication or the wireless communication that can operate the transmission, intelligently computes and compares based on the air pollution data, and then intelligently selects and issues the control command to be transmitted to the gas detection modules in the plurality of air cleaning devices for receiving under the connection of the activation mechanism with the wired communication or the wireless communication that can operate transmission, and then the control command is transmitted to the driving control component to regulate the activation operation of the fan, wherein the fan is controlled to start guiding the air pollution passing through the filtering element for filtration, so that the gas state in the indoor field reaches the cleanliness requirement of clean room level ZAPClean room 6^{+}, 7^{+}, 6, 7, 6^{-} or 7^{-}.

9. The indoor air cleaning method according to claim 5, wherein the gas detection modules in the plurality of air cleaning devices are connected to the central control and regulation device under the handshake communication protocol of the wired communication or the wireless communication, wherein when the wireless communication and the wired communication are both disconnected, it allows to autonomously compute and compare the air pollution data outputted by the gas detection modules based on the air pollution data, and then transmit the control command to the driving control component to regulate the activation operation of the fan, wherein the fan is controlled to start guiding the air pollution passing through the filtering element for filtration, so that the gas state in the indoor field reaches the cleanliness requirement of clean room level ZAPClean room 6^{+}, 7^{+}, 6, 7, 6^{-} or 7^{-}.

10. The indoor air cleaning method according to claim 5, wherein the cloud computing service device intelligently computes a cleanliness according to

a number of suspended particles passing through the indoor field in real time, and intelligently selects and issues the control command to be transmitted to the gas detection modules in the plurality of air cleaning devices for receiving, and then the control command is transmitted to the driving control component to timely regulate the activation operation of the fan of the air cleaning device, so as to randomly change and adjust the airflow volume and the actuation time period based on the cleanliness of the number of suspended particles in real time, whereby the cleaning efficiency of the indoor field is improved, the environmental noise of the indoor field is reduced, an internal circulation directional airflow is generated in the indoor field, and the air pollution is guided to pass through the filtering element multiple times for filtration, so that the gas state in the indoor field reaches the cleanliness requirement of clean room level ZAPClean room 6^{+}, 7^{+}, 6, 7, 6^{-} or 7^{-}.