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(21) Application No.202341000354 A
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(54) Title of the invention : SYSTEM AND METHOD FOR ENABLING INTERNET OF THINGS-BASED VISCOSITY ALERT SYSTEM

(51) International classification :C09D0007430000, C02F0001000000, A61K0008730000, A61B0018040000, B01J0019180000
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Filing Date :01/01/1900
(87) International Publication No : NA
(61) Patent of Addition to Application Number :NA
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Filing Date :NA

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(57) Abstract :
The present invention provides a viscosity alerting system based on Internet of things system. Which will solve the problem of uncontrolled stirring of sugar syrup which are based on viscosity. System comprises of one or more sensors within stirrer. System controls stirring based on obtaining and determining the change in range viscosity of chemical solution, based on matching of difference in determined range of viscosities system will control stirring at desired viscosity.

No. of Pages : 22 No. of Claims : 10

(12) PATENT APPLICATION PUBLICATION
(19) INDIA
(22) Date of filing of Application :10/01/2023

(21) Application No.202341001920 A
(43) Publication Date : 20/01/2023

(54) Title of the invention : A NOVEL FEATURE EXTRACTION AND CLASSIFICATION OF BREAST CANCER USING ENSEMBLE PRE-FULLY CONNECTED LAYERS IN CONVOLUTIONAL NEURAL NETWORK

(51) International classification :G06K0009620000, G06N0003040000, G06N0003080000, G16H0050300000, A61B0005000000
(86) International Application No :PCT// /
Filing Date :01/01/1900
(87) International Publication No : NA
(61) Patent of Addition to Application Number :NA
Filing Date :NA
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Filing Date :NA

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(57) Abstract :
Breast cancer poses a serious health risk to women and is challenging to treat. Early breast cancer detection has sparked fresh research during the past ten years. The WHO claims that breast cancer can be cured if it is found early. Global mortality is reduced by early disease diagnosis. To identify and track down issues, Computer Aided Diagnostic (CAD) tools are frequently employed. CAD systems have recently been employed to increase study accuracy by the Convolutional Neural Network (CNN). Automated and precise CAD technologies are required to fight against the disease. The present invention disclosed herein is a novel feature extraction and classification of breast cancer using ensemble pre-fully connected layers in convolutional neural network comprising of: Input Image (201); Preprocessing (202); Normalization (203); Segmentation (204); Feature Extraction (205); Classification (206); used to extract the feature in the digital mammogram images database to classify the breast cancer. The present invention disclosed herein uses ensemble pre-fully connected layers in convolutional neural network to convert unprocessed samples into more localized representations. The performance analysis of the proposed invention shows that the accuracy of 98.58%.

No. of Pages : 17 No. of Claims : 9

(12) PATENT APPLICATION PUBLICATION
(19) INDIA
(22) Date of filing of Application :16/12/2022

(21) Application No.202241073038 A
(43) Publication Date : 30/12/2022

(54) Title of the invention : A SYSTEM FOR PROVIDING MACHINE LEARNING BASED INTERPRETATION OF DIGITAL VIDEO WITH COMPUTER VISION MEANS

(51) International classification :G06K0009620000, G06N0020000000, G06N0020200000, G16H0015000000, G06N0005000000
(86) International Application No :PCT//
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(87) International Publication No : NA
(61) Patent of Addition to Application Number :NA
Filing Date :NA
(62) Divisional to Application Number :NA
Filing Date :NA

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(57) Abstract :
The present invention discloses a system for providing machine learning based interpretation of digital video with computer vision means. the present invention formalizes fundamental ideas and methods for video interpretation in the context of building. Its main goal is to develop a system that will enhance communication between existing knowledge of construction operations and computer vision methods. This technique is used to direct the identification of aberrant production scenarios, the classification of work states, and the detection and tracking of project resources. The developed strategy might serve as a basis for creating automated video interpretation techniques that would significantly advance the way data is now collected and analyzed in the various industry. The proposed video interpretation approach has the potential to be a more productive data processing tool, according to experimental findings from preliminary idea. Accompanied drawings [FIG. 1-2]

No. of Pages : 22 No. of Claims : 9

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शासकीय जर्नल

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(22) Date of filing of Application :15/09/2022

(21) Application No.202241052878 A
(43) Publication Date : 23/09/2022

(54) Title of the invention : Clinical Decision Support System using Artificial Intelligence

(51) International classification :G16H0010600000, G16H0050700000, G16H0050200000, G06Q0050220000, G06Q0010100000
(86) International Application No :PCT//
Filing Date :01/01/1900
(87) International Publication No : NA
(61) Patent of Addition to Application Number :NA
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(62) Divisional to Application Number :NA
Filing Date :NA

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(57) Abstract :
The purpose of a similarity search in a clinical decision support system is to estimate the likely result of implementing on a current patient those therapeutic activities that were conducted on patients who were similar to the patient being evaluated. The system performs an analysis of the stored electronic medical records of patients who have comparable conditions in order to provide diagnostic and treatment recommendations for the present patient. The system obtains the patient's health record, determines which clinical actions have already been applied to the patient, generates classifiers associated with potential future clinical actions, generates a success value for each health record of another patient by making use of the classifiers, displays the health record of the other patient whose health record has the greatest success value, and indicates a proposed clinical action that is to be applied on the patient. Additionally, the system computes a quality value that provides an indication of the chance that a series of clinical activities that were carried out on a patient who is comparable to the patient in question would be effective if carried out on the patient.

No. of Pages : 18 No. of Claims : 5

Australian Government
IP Australia

CERTIFICATE OF GRANT
INNOVATION PATENT

Patent number: 2021103962

The Commissioner of Patents has granted the above patent on 4 May 2022, and certifies that the below particulars have been registered in the Register of Patents.

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Title of invention:

A portable system and method for real-time monitoring the indoor air quality using IoT

Name of inventor(s):

Bethapudi, Prakash; Namana, Murali Krishna; Padma, Yenuga; Nagendra Kumar, Yalla Jeevan; Saxena Das, Shruti; GANDI, NETAJI; Badhan, Ajay Kumar; ADAPA, SRINIVAS and Rao, P. Srinivasa

Term of Patent:

Eight years from 8 July 2021

NOTE: This Innovation Patent cannot be enforced unless and until it has been examined by the Commissioner of Patents and a Certificate of Examination has been issued. See sections 120(1A) and 129A of the Patents Act 1990, set out on the reverse of this document.

COMMONWEALTH OF AUSTRALIA
AUSTRALIA
PATENT OFFICE

Dated this 4th day of May 2022

Commissioner of Patents

PATENTS ACT 1990

The Australian Patents Register is the official record and should be referred to for the full details pertaining to this IP Right.

This data, for application number 2021103962, is current as of 2022-08-26 21:00 AEST

Extracts from the Patents Act, 1990

Sect 120(1A) Infringement proceedings in respect of an innovation patent cannot be started unless the patent has been certified.

Sec 128 **Application for relief from unjustified threats**

(1) Where a person, by means of circulars, advertisements or otherwise, threatens a person with infringement proceedings or other similar proceedings a person aggrieved may apply to a prescribed court, or to another court having jurisdiction to hear and determine the application, for:

(a) a declaration that the threats are unjustifiable; and

(b) an injunction against the continuance of the threats; and

(c) the recovery of any damages sustained by the applicant as a result of the threats.

(2) Subsection (1) applies whether or not the person who made the threats is entitled to, or interested in, the patent or a patent application.

Sec 129A **Threats related to an innovation patent application or innovation patent and courts power to grant relief.**

Certain threats of infringement proceedings are always unjustifiable.

(1) If:

(a) a person:

(i) has applied for an innovation patent, but the application has not been determined; or

(ii) has an innovation patent that has not been certified; and

(b) the person, by means of circulars, advertisements or otherwise, threatens a person with infringement proceedings or other similar proceedings in respect of the patent applied for, or the patent, as the case may be;

then, for the purposes of an application for relief under section 128 by the person threatened, the threats are unjustifiable.

Courts power to grant relief in respect of threats made by the applicant for an innovation patent or the patentee of an uncertified innovation patent

(2) If an application under section 128 for relief relates to threats made in respect of an innovation patent that has not been certified or an application for an innovation patent, the court may grant the application the relief applied for.

Courts power to grant relief in respect of threats made by the patentee of certified innovation patent

(3) If an application under section 128 for relief relates to threats made in respect of a certified innovation patent, the court may grant the applicant the relief applied for unless the respondent satisfies the court that the acts about which the threats were made infringed, or would infringe, a claim that is not shown by the applicant to be invalid.

Schedule 1 **Dictionary**

certified, in respect of an innovation patent other than in section 19, means a certificate of examination issued by the Commissioner under paragraph 101E(e) in respect of the patent

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(22) Date of filing of Application :10/04/2022

(21) Application No.202241021385 A
(43) Publication Date : 22/04/2022

(54) Title of the invention : Cyber Crime Digital Forensics Security issues based on Internet of Things

(51) International classification :H04L0029080000, H04L0029060000, H04W0004700000, H04L0009060000, G06F0021640000
(86) International Application No Filing Date :PCT// / :01/01/1900
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(61) Patent of Addition to Application Number :NA Filing Date :NA
(62) Divisional to Application Number :NA Filing Date :NA

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(57) Abstract :
The Internet of Things (IoT) connects practically all physical and virtual things in the environment to the Internet, resulting in new digitised services that improve people's lives. Smart agriculture, wearables, connected healthcare, connected automobiles, and other IoT applications are currently having a direct impact on our daily lives. Despite the numerous advantages provided by the IoT system, it poses several security concerns. To maintain the successful adoption of IoT applications, IoT makers should make resolving these difficulties a top priority. IoT device owners should ensure that their gadgets have strong security features built in. The number of security threats and cybercrimes has increased dramatically as the Internet has evolved. Furthermore, the IoT system presents more opportunity for cybercriminals to attack various applications and services of the IoT system, resulting in a direct impact on users, due to insufficient security measures installed in IoT devices. Digital forensics is one of the methods used to combat the rising number of cybercrimes. Cybercrime using IoT technology can penetrate the virtual space and harm human life, necessitating the use of IoT forensics to detect and counter such attacks. A review of IoT security and forensics is presented in this work.

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(22) Date of filing of Application :24/06/2021

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(43) Publication Date : 30/07/2021

(54) Title of the invention : BORDER-LESS TRADING SYSTEM USING BLOCKCHAIN TECHNOLOGY

(51) International classification	:G06Q0040040000, G06Q0020380000, G06Q0020060000, G06F0016270000, H04L0009320000
(31) Priority Document No	:NA
(32) Priority Date	:NA
(33) Name of priority country	:NA
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(57) Abstract :
Block chain is the one of the best secured distributed database design, a significant number of cryptocurrencies and financial trading markets using digital assets have also been introduced over time. Despite the fluctuation in the exchange rate, blockchains and its cryptocurrencies have no remarkable change overall. They still follow the old-traditional trading mechanism, which exchanges between cryptocurrencies and at currencies. Although few projects are emerging to enlarge a blockchain's trading usage, i.e., cross-chain liquidity, it still limits itself on swapping one type of cryptocoin with another type. Beyond supporting swapping coins, the blockchain could be applied and extended to become a trade-payment network that connects multiple solitary blockchain-based platforms. In this work, we propose a heuristic cross-chain trading system that leverages the blockchain technology to build a fair and border-less trading network across multiple decentralized blockchains.

No. of Pages : 7 No. of Claims : 9

Patent Search

Invention Title	A SYSTEM AND METHOD FOR ERADICATING THE ACCIDENTS AT STEEP CURVED PATHS
Publication Number	08/2021
Publication Date	19/02/2021
Publication Type	INA
Application Number	202141006165
Application Filing Date	13/02/2021
Priority Number	
Priority Country	
Priority Date	
Field Of Invention	ELECTRICAL
Classification (IPC)	H02J0009060000, F21Y0115100000, G08G0001000000, F21V0023020000, F21S0009030000

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Abstract:

The present invention relates to a system (100) and method (300) to eradicate the accidents at steep curved paths (110). The system consists of a first sensor (210) ar sensor (220). The first sensor (210) identifies the vehicle (310) and provides a signal to the microcontroller (230) which allows the LED light array (240) to glow. If the s (310) leaves the second sensor (220), the program of the microcontroller (230) allows the LED light array (240) to turn off the light. If the same vehicle (310) didn't pas sensor (220), the microcontroller activates the GPS unit (250) to trace the location of the vehicle. The GPS unit (250) alerts the control room about the abnormality an condition, the LED lights (240) remains in glowing condition. The entire system (100) is powered by a solar UPS unit (270) for uninterrupted power supply.

Complete Specification

Claims:We claim

1. The system (100) for eradicating accidents at steep curved path comprises:
a) a first sensor (210) located at the entry of a steep curve path (110);
b) a second sensor (220) located at the exit of a steep curve path (110);
c) a microcontroller unit (230);
d) an array of LED lights (240);
e) a GPS unit (250) to trace the location of a vehicle;
f) a GSM unit (260) to send a message during an emergency; and
g) a solar UPS unit (270) to power all the units of the system.
2. The first (210) and second sensors (220) according to claim 1 can be selected from a camera, image sensors, loop sensors, ultrasonic sensors, etc.
3. The microcontroller unit (230) according to claim 1 is selected from Arduino Uno.
4. The microcontroller (230) according to claim 1 is placed close to the first sensor (210) and a second sensor (220) separately.
5. The microcontroller (230) according to claim 1 is integrated with EEPROM to capture and store the information from the sensors for a limited period.
6. The microcontroller (230) according to claim 1 is pre-programmed to provide the necessary instructions based on the information sourced from multiple units sensors, GPS uint (250), GSM unit (260) etc.

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TITLE OF INVENTION	INDOOR AIR QUALITY MONITORING DEVICE USING INTERNET OF THINGS (IOT).
FIELD OF INVENTION	MECHANICAL ENGINEERING
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FORM 2
THE PATENT ACT 1970 &
The Patents Rules, 2003
COMPLETE SPECIFICATION
(See section 10 and rule 13)

1. TITLE OF THE INVENTION:
AIR QUALITY MONITORING DEVICE USING INTERNET OF THINGS (IOT)

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REAMBLE TO THE DESCRIPTION

PROVISIONAL	**COMPLETE**
The following specification describes the	The following specification Invention. Particularly describes the invention and the manner in which it is to be performed.

FIELD OF THE INVENTION

My invention "**AIR QUALITY MONITORING DEVICE USING INTERNET OF THINGS (IOT).**" is related to air quality monitoring systems and methods and also customized for a specific structure, such as a building or a home, and/or the occupants for improving the air quality parameters.

BACKGROUND OF THE INVENTION

With respect to air quality in the home or in schools, incidence rate of asthma, which is often triggered by poor indoor air quality, is growing exponentially. It has more than doubled since the eighties, with the current level of 17 million American sufferers projected to double again in two decades. A recent national survey reported that 56% of all households now contain at least one member with allergies or asthma. In all, over 90 million Americans are reported sufferers of asthma or allergies, with direct costs of about $19 billion annually for medical care, pharmaceuticals, and asthma and allergy products. For example, air cleaners are now one of the fastest growing household products, with over 16 million households using at least one unit. Particular aspects of indoor air quality are a concern, such as toxic molds, dust mites, carbon monoxide poisoning, allergens, and various chemical pollutants.

With respect to air quality in commercial or industrial environments, the U.S. Environmental Protection Agency (EPA) estimates that one-third of the 4.5 million commercial buildings in the U.S. offer less than acceptable air quality. The EPA has also stated that indoor air quality is one of the top five environmental health risks of our time. Business Week in its lead cover story of June 5th, 2000, *"Is Your Office Killing You? The dangers of sick buildings",* reported that U.S. companies could save as much as $258 billion annually by preventing sick-building illnesses and improving worker performance by creating offices with better indoor air.

Thus, indoor air quality is an issue of great importance in residential, commercial and industrial environments. Before the air quality in these environments can be improved, it should be first measured and evaluated to determine if a problem exists and then diagnosed to evaluate the nature of the problem. Unfortunately, it is currently very expensive to obtain a customized indoor air quality assessment of a building plus a customized set of recommendations to solve any potential air quality problems uncovered. To accomplish this today requires the use of costly, hard to apply instruments and the expertise of relatively expensive industrial hygiene professionals.

Beyond the use of an industrial hygienist employing sophisticated air measurement instruments, there have been only limited options to help the building owner or occupant obtain information about the air quality of their environment. One such device is described in U.S. Pat. No. 5,553,006. This patent discloses a system that is limited to gathering air quality data and transmitting the

data through a network, serial interface or phone line to a user. There are also systems, as discussed in U.S. Pat. No. 5,892,690, that gather air quality data from a building and then send the data through the Internet to a customer accessible website, where it is archived and available to the customer in graphically displayed form. Although convenient for a customer, there is no analysis of the data, nor is there any way for the system to adapt its operation or to be customized automatically based on the specific building being measured or the data that is gathered. U.S. Pat. No. 6,125,710 discloses a networked air measurement system and describes a method for inexpensively gathering air quality or environmental data. However, it does not describe any methods for customizing the data taking process to a given building or analyzing the data that is taken.

Some available devices measure and data log some environmental air parameters and then send emails to a customer based on predetermined levels being exceeded, but do not take into account anything more sophisticated in their analysis of the data. Nor do these devices employ any method to reprogram or modify the testing program remotely.

U.S. Pat. No. 4,226,115 describes an outdoor air monitoring device, held aloft by a balloon, that employs remote radio wave communication for triggering the taking of a sample of ambient air. However, this device is not designed for indoor use, requires intervention of a trained operator to decide when to take the sample and involves expensive technology with limited range due to the use of radio wave communication for transmission to the device.

None of the prior art disclosed provides the user with customized information and recommendations about the air quality within or immediately around a specific building. As such, there is a need for an economical, easy to use system to provide customized, understandable and easily accessible information to a building owner or occupant. Also, there is a need for a system that can properly diagnose air quality problems and recommend solutions without requiring the expense of an industrial hygiene professional.

PRIOR ART SEARCH

CH344735A1955-06-131960-02-29 Norco Chem Antifoam composition solid.
US4090248A1975-10-241978-05-16 Powers Regulator Company Supervisory and control system for environmental conditioning equipment.
US4123796A1976-11-191978-10-31 Powers Regulator Company Controller for environmental conditioning apparatus.
US4141006A1976-07-141979-02-20 Braxton Kenneth J Security system for centralized monitoring and selective reporting of remote alarm conditions.
US4217646A1978-12-211980-08-12 The Singer Company Automatic control system for a building.

US4226115A1978-06-301980-10-07 The United States Of America As Represented By The Administrator Of The United States Environmental Protection Agency Remote controlled air sampler.
WO2009063106A1 *2007-11-122009-05-22 Farmbiocontrol, S.L. Procedimiento de control y de seguridad biológica en installations ganaderas y granjas.
WO2012023136A12010-08-152012-02-23Airbase Systems Ltd. Device, system and method for personal health monitoring based on multitude-points environmental data.
WO2014194480A1 *2013-06-052014-12-11Microsoft Corporation Air quality inference using multiple data sources.
WO2014183100A3 *2013-05-102015-02-19Wello, Inc. System and process for notification of contagion risk conditions and mitigation thereof.
US10627380B22017-02-082020-04-21International Business Machines Corporation Multi-source data assimilation for three-dimensional environmental monitoring.

OBJECTIVE OF THE INVENTION

1. The objective of the invention is to a air monitoring device is disclosed having an air monitoring unit with at least one sensor for measuring data of an air quality parameter and a computer for storing the air quality parameter data received from the sensor using internet of things (IOT).
2. The other objective of the invention is to the air monitoring unit may use an installed or a portable system, or a combination of both, for measuring the air quality parameters of interest.
3. The other objective of the invention is to a remote data center also provided, and the data uploaded to the data center from the unit by a communications media such as the internet of things (IOT).
4. The other objective of the invention is to the Information or instructions may also be downloaded from the data center to the unit via the communications media for controlling or modifying the function of the unit.
5. The other objective of the invention is to the invented Device the air monitoring unit may contain sensors, and a multiple tube and vacuum system used to transport samples of air to the air monitoring unit from one or more remotely located sampling locations.
6. The other objective of the invention is to this air monitoring system may involve a star based tube structure or “octopus” type arrangement that uses many tubes each making a “office run” from the sampling location to the air monitoring unit and also to use a networked air sampling system that includes a common centrally located air monitoring unit containing one or more sensors.
7. The other objective of the invention is to a wherein the expert system generates the information, and is adapted to send the information to the air

monitoring unit. The invention is to a wherein the expert system is adapted to send information to the air monitoring unit to command the air monitoring unit to take a grab sample.

8. The other objective of the invention is to a wherein the air monitoring unit includes operational parameters, and the remote data center is adapted to send information to the unit to change the operational parameters. The invention is to a wherein the air monitoring unit includes a program to instruct the air monitoring unit in measuring air quality parameter data, and the remote data center is adapted to send information to the air monitoring unit to change the program.
9. The other objective of the invention is to a wherein the air monitoring unit includes a set-up parameter, and the remote data center is adapted to change the set-up parameter in the air monitoring unit.

SUMMARY OF THE INVENTION

The air monitoring system of the invention may be a portable or installed system, or may have one or more permanently installed components and one or more portable components. The air monitoring system includes an air monitoring unit. The air monitoring unit may be a portable unit, such as a handheld unit or a reasonably portable unit, containing one or more sensors for acquiring data on certain air quality parameters. The unit may be moved indoors to acquire data on certain air quality parameters in desired locations in a building and may also be moved outdoors around the building to acquire data on certain environmental and air quality parameters of interest. The portable unit may log the sensor data and communicate it to the user through a direct local interface or through the Internet.

The installed system may be an air monitoring unit that is installed in a building to monitor one or more spaces. If monitoring multiple spaces, the air monitoring unit may use one or more individual sensor units which contain one or more different sensors that are distributed inside or outside a building to monitor environmental and other air quality parameters of interest. These remotely distributed sensor units communicate with a central unit through a digital network or other communication link such as a power line or wireless communication. The central unit logs the sensor data and communicates the data to the user through a direct local interface or through the Internet.

Alternatively, the air monitoring unit may contain sensors, and a multiple tube and vacuum system may be used to transport samples of air to the air monitoring unit from one or more remotely located sampling locations. This air monitoring system may involve a star based tube structure or “octopus” type arrangement that uses many tubes each making a “home run” from the sampling location to the air monitoring unit. Another option is to use a networked air sampling system that includes a common centrally located air monitoring unit containing one or more sensors. This system, as described in U.S. Pat. No. 6,125,710 and incorporated

herein by reference, involves a common backbone tube with branches, so that multiple packets of air are routed through the same backbone from multiple locations.

As stated previously, the air monitoring unit may be connected to the direct local interface or to the Internet. The connection of the air-monitoring unit to the Internet can be achieved in one of several ways. A direct local connection to the building's data network, assuming the building has such a network, can be used. A common network in use within commercial facilities is an Ethernet system. Assuming this network has a connection to the Internet, the network may be used as a connection to the Internet.

Another method employs a local wireless connection or other systems that are commonly used in cordless phones. This involves a base unit transceiver that connects to a local phone line in the building and another transceiver in the air monitoring unit. When the unit needs to send or receive data, the unit checks the phone line to determine if it is busy, and if not the unit makes a call and sends or receives data through a local Internet Service Provider (ISP). Another method is to use a cellular phone to directly access a local or remote ISP. Finally, the monitoring unit may connect to a building control network in the building, which is connected to the Internet. It will be understood that any method of connecting to the Internet may be used.

A portable unit may incorporate Global Positioning System (GPS) technology. This allows the precise location of the air monitoring unit to be determined. Use of GPS technology eliminates the need for the operator to input the unit location, and permits the location data to be stored and associated with the proper building and room within that building. The test location is one type of information used to customize the analysis of the air monitoring system, so that the analysis applies to the specific building that is being monitored.

The air monitoring system may use an expert system to analyze air quality information for a variety of purposes. The expert system may operate the air monitoring unit and analyze the results of tests with respect to a specific building or room. The expert system may include a program or a combination of programs that uses rule based, case based or pattern recognition methods or a combination of these methods to analyze data and make decisions and recommendations based on user supplied information, environmental data, such as weather, and measured air quality data. Alternatively, or in addition, the expert systems, sometimes referred to as artificial intelligence (AI) systems, may use fuzzy logic, neural networks or other AI techniques to analyze data or make decisions. The basis of the rules on which the expert system is founded may be a combination of knowledge supplied by experts and experience that the system achieves through feedback as to the accuracy of its analysis or decisions.

The Internet may be used to download information from a website to the air monitoring unit to change its program, operation, and/or setup based on specific

information obtained about the building, its occupants and its surrounding environment. This customization of the unit may be achieved by an expert system located remotely or in the air monitoring unit. Preferably, customization of the unit is achieved through the Internet due to the ease and simplicity of using a web browser on an Internet website. This aspect of the invention may involve the user answering questions about the building on the website.

The information may then be used to create a customized monitoring program to analyze the specific building, particularly upon initial setup of the air monitoring system. This program is then downloaded into the memory of the monitoring unit to control its operation. As air quality parameter data is acquired in and around the building, the program, operation and/or setup of the monitoring unit may be modified or updated based on the measured data. Alternatively, non-expert system approaches may be used to customize the unit based on building specific information. However, an expert system provides customization based on an expert system's ability to process information in a way that simulates a human expert.

For example, the expert system may be used to analyze the data in real time and to modify the monitoring protocol in order to perform a better analysis. One such change in monitoring may be the expert system triggering the taking of a grab sample based on a real time analysis of the acquired data.

A modular structure for an air monitoring unit may utilize centrally located sensors. For example, the unit may use a card cage or sensor bay configuration, with the sensors mounted on cards that slide into a card cage or sensor bay in the air monitoring unit. Depending on specific needs or potential problems in a building, the unit may be customized with various sensors. The selection of the sensors may be based on a reported problem, questions answered by the user or may be generated by the expert system using more sophisticated analysis of additional information.

For better understanding of the overall quality of air in a building or in its immediate surrounding, an “IAQ Index” that involves a weighted combination of more than one air quality parameter can be used. The score of the particular building may be compared to the scores of other buildings of like type or in a similar environment or location to give a percentage score from 0 to 100% that indicates where the specified building falls in comparison to the other buildings in the comparison set. Information can then be provided to help a user increase the score with specific recommendations that will provide solutions to improving those air quality parameters on which the specified building had a low score.

The invention, an air monitoring system is provided. The air monitoring system comprises an air monitoring unit having at least one sensor for acquiring air quality parameter data, and a computer having an expert system for controlling the air monitoring unit based at least in part on the acquired air quality data.

The invention, an air monitoring system is provided. The air monitoring system comprises an air monitoring unit having at least one sensor for measuring air quality parameter data. The air monitoring unit is adapted to download information from a remote data center through a communication link to modify the function of the air monitoring unit. The invention, an air monitoring system is provided. The air monitoring system comprises an air monitoring unit having at least one sensor for measuring air quality parameter data and a computer for storing the data received from the sensor. A remote data center includes a database for storing the air quality parameter data and receiving inputted characteristics and an expert system that interacts with the air quality parameter data for analysis of the data in relation to the certain inputted characteristics. A communication link is provided between the data center and the air monitoring unit. The remote data center downloads information to the air monitoring unit through the communication link to modify the function of the air monitoring unit.

The invention, an air monitoring unit comprises at least one removable card having at least one sensor and a shroud enclosing the sensor, and a conduit connected to the shroud. The invention, an air monitoring system comprises an air monitoring unit including a grab sampler contained within the air monitoring unit for acquiring an air sample. A remote control unit controls the air monitoring unit, and a communications link is provided between the control center and the air monitoring unit. The control unit is adapted to download a command to the air monitoring unit to trigger the grab sampler to acquire an air sample.

The invention, an apparatus comprises an air monitoring system having at least one sensor for acquiring air quality data at a selected indoor location and a computer including an expert system for analyzing the acquired air quality data and-reaching a conclusion regarding air quality of the selected indoor location. The invention, an apparatus comprises an air monitoring system having at least one sensor for acquiring air quality data at a selected indoor location and a control site for controlling operation of the air monitoring system through the Internet.

The invention, a method for monitoring indoor air quality comprises the steps of providing information representative of a selected indoor location to a remotely located control unit, positioning an air quality monitoring unit in the selected indoor location downloading customized operating information from the control unit to the air quality monitoring unit, and monitoring the air quality at the selected location in accordance with the customized operating information. The invention, a sensor card for use in an air quality monitoring system comprises a card having a connector for electrical connection to the air quality monitoring system and an air quality sensor mounted on the card for providing sensor data through the connector to the air quality monitoring system.

The invention, an air quality monitoring system comprises at least one air quality sensor for acquiring sensor data at a selected indoor location, a control unit for generating a grab sample command in response to the acquired sensor data meeting a predetermined criterion, and a grab sample unit for acquiring an air

sample at the selected indoor location in response to the grab sample command from the control unit. The invention, an air quality monitoring unit comprises a housing, a plurality of easily removable air quality sensors mounted in said housing, and a programmable control unit having an interface to the air quality sensors. The control unit is programmable so as to customize the air quality monitoring unit for operation with different sensors.

BRIEF DESCRIPTION OF THE DIAGRAM

FIGS. 1A and 1B is a schematic block diagram of an air monitoring system.
FIG. 2: is a schematic block diagram of an air monitoring system.
FIG. 3: is a cross-sectional side view of a portable air monitoring unit.
FIG. 4: is a front perspective view of a sensor card.
FIG. 5 is a perspective view of a shroud used on a sensor card.
FIG. 6: is a schematic block diagram of an expert system.
FIGS. 7A and 7B is a schematic block diagram of an air monitoring system.
FIGS. 8A and 8B is a schematic block diagram of an air monitoring system including a grab sampler.

DESCRIPTION OF THE INVENTION

FIGS. 1A and 1B: a schematic block diagram of one embodiment of an air monitoring system 100 according to the present invention is shown. The air monitoring system may be a portable or an installed system, or a system having a combination of portable and installed components. The air monitoring system 100 includes an air monitoring unit 102. In a portable system, the air monitoring unit 102 may be hand held or reasonably portable. The air monitoring unit includes a sensor unit 103 having at least one sensor 104 and a control unit 106. In a portable system the air to be sampled, or sample locations 108, may be taken from the area immediately surrounding the air monitoring unit or through a tube (not shown) from one or more remote sample locations.

An installed system may have many different configurations. The installed system may include an air monitoring unit 102 installed in a building to monitor one or more spaces within the building. Referring to FIG. 2, the installed system may use one or more sensor units 110 to monitor sample locations 108, where each sensor unit 110 has one or more sensors 104 for monitoring desired air quality parameters. Each sensor unit 110 may, for example, have the configuration of sensor unit 103 shown in FIGS. 1A and 1B. The sensor units may be distributed in desired locations inside and outside the building. The sensor units 110 connect through a network connection 112 to a central computer and controller 118 or 162. For example, as shown in FIG. 2, the sensor units connect to a sensor network interface control unit 116, which then connects to the central computer and controller 118 or 162. The central computer and controller 118 or 162 may connect to other equipment and interfaces as shown in FIGS. 1A and 1B. The network connection 112 used to connect the sensor units

to the central unit may be a digital communication network of either proprietary design or open systems design such as a Lon works or BACNet protocol.

The network connection 112 may also be part of a building control network or part of an Ethernet system used for the building's information system communication network. A twisted pair network, an optical fiber, a power line, or wireless technology may be used for implementation.

FIGS. 1A and 1B: shows an implementation of the air monitoring system 100 where one sensor unit 103 is connected to control unit 106 through a sensor interface card 122 without need for a distributed digital network. This approach may be used for a portable air monitoring unit 102 to monitor one sample location 108, or may be used in an installed system to monitor many sample locations 108 with the addition of extra installed equipment that brings air from multiple sample locations to the air monitoring unit 102 in sequential fashion. A star based system of tubes and centrally located solenoid valves may be used to sequentially pull air samples from remote sample locations to the air monitoring unit. Alternatively, a networked air sampling system, as described in U.S. Pat. No. 6,125,710, may utilize a central backbone with branches to route multiple packets of air from multiple sample locations through the same backbone. Distributed switches, such as air solenoid valves, in the branches are controlled by a digital control network to bring air samples through the common backbone tube to the air monitoring unit, such that the packets of air may be monitored by the sensors 104 and the control unit 106 may store the air quality parameter data generated by the sensors.

For both the portable and the installed implementations, the air monitoring system 100, including the central unit 106 and the sensor unit 103, may be used in a portable fashion and may be moved from building to building to monitor different buildings or structures over time on either an as needed or on a periodic basis. For the installed system of FIG. 2, the central computer and controller 118 may be moved from building to building, and the distributed system components, such as the sensor units 110, may be installed permanently or semi-permanently. Typically, in the system of FIGS. 1A and 1B, the air monitoring unit 102, including the sensor unit 103 and the control unit 106, may be moved from building to building, and the tubing and controls may be installed permanently or semi-permanently. As a consequence, at least the control unit 106 of FIGS. 1A and 1B, and the central computer and controller 118 of FIG. 2 may need to be reprogrammed and customized whenever the device is used to monitor a different building.

Referring to the air monitoring unit 102 of FIGS. 1A and 1B, the air to be sampled is first brought into a manifold 124. The manifold is an air conduit inside the sensor unit 103. From manifold 124, the air is routed to one or more sensors 104. The air may be routed using switches 342, such as solenoid valves or pumps or other such devices. As shown in FIGS. 1A and 1B, the manifold itself may contain sensors, such as on a manifold sensor card 126, to measure environmental or air

quality parameters, such as temperature, humidity, barometric pressure or ozone level, which can change after the air enters the air monitoring unit. For example, as the air travels through the air monitoring unit the temperature may increase or ozone may react with the walls of the tubing in the unit, thereby reducing the accuracy of the measurement. These parameters are preferably measured soon after the air is brought into the air monitoring unit 102.

From the manifold, air may be routed to various sensors 104. As shown in FIGS. 1A and 1B, the air is routed to into a radon detector 128, a particle detector 132 and a grab sampling unit 130. The radon detector 128 may be a continuously detecting instrument that may use one of various methods for detecting the presence of Radon gas. One possible method is to trap air particles that may be contaminated by the Radon gas in a piece of filter paper next to a radiation softened DRAM memory chip. Daughter decay elements from the Radon gas that are trapped in the filter paper emit alpha particles into the memory chip. This memory chip is filled with data and any changes in the state of the data indicate that an alpa particle has hit the memory chip. The number of counts of these alpha particles over time gives a reading of the amount of Radon gas present in an area. Alternative approaches for measuring radon gas continuously, such as with Geiger detector type systems or other approaches, may also be used.

The grab sampling unit 130 may include filter cartridges to capture particulate material and/or sorbent tubes to capture Volatile Organic Compounds (VOC's). Additionally, the grab sampling unit 130 may store air in Suma canisters, Tedlar bags or other inert storage canisters. The operation of the grab sampler unit 130 is explained in further detail below. Any type of sensor may be used in sensor unit 104, although as mentioned below sensors that use particles as part of the measuring process are preferably placed next in the air sampling path.

The air sample may be routed through only one sensor, no sensor via the bypass 343, which may include a switch 342, such as a solenoid or a pump, or may travel simultaneously in parallel through two or more sensors as controlled by the switch 342 as commanded by the central computer and controller 162. Since the radon and particle detectors' and grab sampling units' measurements are preferably based on a known quantity of air passing through the sensor, that the air flow may be accurately controlled through these sensors. Consequently, an airflow sensor 344 may be used in series with the pump to measure the air monitoring unit's airflow.

The pump's air flow rate can then be controlled via a variable speed pump control or some variable damper, orifice, or restriction device. The central computer and controller 162 or some other control unit such as an analog control circuit, located for example on the sensor interface card 122, may also be used to control the pump's airflow rate. If the pump's air flow rate is controlled and the flow rate is controlled through only one of the sensors 104, then their air flow rate is controlled. Moreover, if the air-flow passes through two sensors simultaneously the split of air flow between these sensors may need to be fixed through some

restrictive and potentially adjustable orifices or other flow adjusting device to accurately adjust the split of air between the two sensors. In this latter case, the air flow of the pump may be increased to set the air flow through these devices if two or more devices are operating in parallel. Alternatively, flow controlled pumps may be used for the switch 342 for controlling flow rate individually through each of the sensors 104. This flow rate control and balancing is not critical for the gas sensors 134 since their measurement is much less dependent on the flow rate through them.

Typically, the radon detector, particle detector or counters, and the grab sampling units are the next sensors to come in contact with the air sample after the manifold sensor and, since these sensors are detecting particulate matter in the air and fewer bends may avoid trapping and losing particles before these sensors. Additionally, filter 341 may be used in front of the gas sensors 134 to protect these sensors from being fouled by dust. Thus, these particles related sensors are typically provided in front of the gas sensors and dust or particulate filters. Additionally, these three types of sensors are not typically placed in series with each other. The air may pass through the particle detector, however some of the particles may be temporarily captured in the particle detector itself and released over time. Also, any bends in the tubing between sensors could cause particles to be lost in the tubing.

Air from the radon detector 128, particle detector 132 and/or the grab sampling units 130 may then pass into additional gas sensors 134, or the air may come directly from the manifold 124 to the gas sensors 134. The gas sensors 134 may include one or more sensors to detect gases such as carbon monoxide, carbon dioxide, Total VOC's (TVOC's), Nitric Oxide (NO), Nitrogen Dioxide (NO_2), Ammonia, air acidity or alkalinity, specific VOC's such as formaldehyde, or any other gases that are of interest to the user of the system. After passing through the gas sensors, the air may pass through a filter 136, such as a HEPA particle filter or a gas filter, to remove hazardous or undesirable gases. Lastly, the air exits the system through an exhaust 138. A vacuum pump 140 may be used to pull air through the air monitoring unit.

An optional feature of the air monitoring unit described above is the use of a sensor bay or card cage 141 having removable cards to allow the easy and rapid reconfiguration of the air monitoring unit by a user to customize the air monitoring unit for a specific location or building. For example, a laboratory building requires different sensors, such as an air acidity sensor, from a classroom building where carbon dioxide is of greater importance for ventilation measurements. Preferably, a closed air path is provided to the sensors to minimize response time and to maintain sample integrity as the air moves through the air monitoring unit. As shown in FIG. 3, a card rack 142 is used to hold sensor cards 144. The sensor cards slide into the rack via slots 146 and are easily removable.

A sensor may include a sensing element 154 that is exposed to the air being monitored and sensor circuitry 155 or other components required for operation of the sensor. As shown in FIG. 4, the sensing element 154 and the circuitry 155 may be mounted on card 144. Sensor circuitry 155 may provide sensor signals to the central controller through a connector 158. A shroud 148 may be provided that substantially covers the sensor element 154 and defines an air flow path. The shroud 148 preferably has an intake port 150 and an exhaust port 152 to allow air flow through the shroud.

The shroud 148 may form an air tight enclosure around the sensing element 154 to form a closed air path. Quick disconnect ports may be provided for the intake and exhaust ports 150 and 152 to facilitate installation and removal of the card. As shown in FIG. 5, a screen 156 or perforated plate may be mounted within shroud 148 to create a pressurized volume at the intake port that produces a laminar flow across the sensing element 154 to the exhaust port 152. The laminar flow from the intake end of the shroud 148 to the exhaust end creates a displacement ventilation effect and minimizes dead spots and recirculation inside the shroud. Air contaminants are thus flushed through the shroud 148 with minimal retention or capture by the shroud.

The removable sensor cards may use a standardized interface protocol and cable connector 158 as shown in FIG. 4, such that the cards can be quickly replaced in the air monitoring unit. To facilitate rapid setup of the unit, the information describing the type of sensor or multiple sensors on the card, in addition to calibration information and other pertinent information about the card can be stored on the card itself in nonvolatile memory. In this manner, the central computer and controller 162 through the sensor interface card 122 can immediately recognize and start taking data from the sensor card without need for user interaction or setup programming.

In a preferred the sensor bay 141 includes a sensor interface board 122 in FIGS. 1A and 1B to support electrical connections for the sensor cards within the sensor bay. The sensor interface board may recognize any sensor card that is plugged into the sensor bay. The sensor card may include configuration information, such as sensor type and calibration. The configuration information may be stored in an EEPROM on the sensor card, such as Microchip Technology's 25C320 EEPROM. Use of a computer for the sensor bay may not be necessary when using the EEPROM. The sensor interface board may read the configuration information in order to recognize the sensor and properly interface with the sensor card related sensor data interface. The configuration information and the sensor data interface are accessed using a serial bus connection, such as an SPI, provided at the connection of the sensor cards to the sensor bay.

A pin connector, provided at the electrical connections, may be used to connect the sensor cards to the sensor bay for power and communications purposes. A control pin on the pin connector may be a power enable pin. The logic signal provided on the control pin may be used to selectively enable power to be applied

to the sensor circuitry 155 on each sensor card. Thus, the application of power to the sensors may be controlled, for example for power efficiency purposes. If the unit is operated on battery power, conservation of power may be useful. Moreover, some sensors may dissipate a relatively large amount of power, and it may not be desirable to run those sensors continuously. Furthermore, ambient temperature within the air monitoring unit may be reduced by selectively running the sensors. Power to each sensor may be controlled individually. The sensors may be turned on as needed and/or may be turned on at certain time intervals, such as everyone or five minutes. Moreover, power to the sensor may be turned off and/or reduced to a lower level of consumption as desired.

FIGS. 1A and 1B: the control unit 106 stores the air quality parameter data measured by the sensors. The control unit 106 may also convert analog sensor data to digital data for storage. As shown in FIGS. 1A and 1B, a sensor interface card 122 may be used to convert the analog data to digital data for storage. The control unit 106 preferably includes a central computer and controller 162 that controls the functions of the air monitoring unit 102. Those functions may include, but are not limited to, controlling the flow of air through sensor unit 103 and acquisition of sensor data, storage of sensor data in some type of nonvolatile memory or storage media, processing sensor data to provide air quality information and communicating with a remotely located control center, such as a website 166. A local display 170 may be provided on the air monitoring unit 102. Preferably, the display 170 includes a touch screen, such that the user cap input information into the control unit.

The air monitoring unit 102 performs data logging while keeping track of different locations of an air sampling sequence. A sampling sequence may be preprogrammed into the air monitoring unit 102. A preferred method of tracking the locations associated with the data logging process is to rely on the user of the air monitoring system to specify the locations before starting a sampling sequence. To enable this function to be performed in an intuitive way, the air monitoring unit is configured in advance with various customized user data. The customized data may be obtained when the user opens an air monitoring system account, such as through website 166. The website is designed to coordinate the user's account with the data that is communicated from the air monitoring unit 102 to the website. Data sent from the air monitoring unit 102 to the website 166 may include sensor data, air quality information derived from the sensor data, location data and/or any other data required for operation of the system.

The portable air monitoring unit 102 may incorporate a Global Positioning System (GPS) system 176. This allows the precise location of the air monitoring unit 102 to be determined. Use of GPS system 176 eliminates the need for the operator to input the air monitoring unit location each time the air monitoring unit is moved or to program a sequence of locations. Once the operator tells the unit the name of a given location the computer can correlate that name with GPS location information for that location so that subsequent testing of that location

will be identified with it's appropriate name and data location. As a result, the monitoring location information is used to customize the air monitoring system, such that the resulting information from future testing of that location is associated with the specific building or room that is being monitored without need for further user input.

The air monitoring unit 102 may be connected to a local network or to the Internet 178. The connection of the air monitoring unit 102 to the Internet can be achieved in several ways using various communications control and media interface 168 interacting with various communication media 180. A local connection into the building's data network, assuming the building has such a network, may be used. A common network in use within commercial facilities is an Ethernet system running at 10 MHz or more.

Assuming this network has a connection to the Internet, the network may be used for access to the Internet. Another method is a local wireless connection involving a 900 MHz spread spectrum or other transmission technique commonly used in cordless phones. This technique utilizes a base unit transceiver that connects to a local phone line and another transceiver in the air monitoring unit 106. When the air monitoring unit needs to send or receive data, the unit checks the phone line to determine if it is busy, and if not the unit makes a call and sends or receives data through a local Internet Service Provider (ISP). Another method is to use a cellular phone to directly access a local or remote ISP. Finally, the air monitoring unit may connect to a building control system, which is connected to the Internet to provide data to the building control system for use by this system and to connect to the Internet. It will be understood that any method of connection to the Internet may be used.

As shown in FIGS. 1A and 1B, the website 166 may include remote web servers 182, a database 174, website programs and page generation software 172 and an expert system 186. The website 166 stores the air quality parameter data in the database 174 for recordkeeping and/or analysis. The data may be published on website 166 for access by the user via the account that the user sets up through the website and accesses through a computer and web browser 184.

The Internet may be used to download information to the air monitoring unit 102 to initialize or modify its program, operation, and/or setup based on specific information obtained about the building, its occupants, its surrounding environment and known or suspected problems. This customization of the unit may be achieved by expert system 186 located remotely in website 166 or, alternatively, in the air monitoring unit. Preferably, customization of the air monitoring unit 102 is achieved through the Internet. This aspect of the invention may involve the user answering questions about the building on the website. In particular, the user may utilize a user computer 184 to access website 166. The website may present to the user a series of questions, possibly determined by expert system 186, which permit the air monitoring unit 102 to be customized for

a specific application. The questions may be a fixed set of questions, or questions later in the session may be modified depending on answers given earlier in the session. The information obtained from the user may be used to create a customized monitoring program to analyze a specific building.

The program is downloaded from the website 166 through the Internet 178 via the communications media 180 and communications control and media interface 168 into the memory of the central computer and controller 162 to control its operation. As air quality parameter data is acquired in and around the building, the program, operation and/or setup of the monitoring unit may be modified based on the acquired data. Non-expert system approaches may be used to customize or personalize the unit based on building specific information. However, the expert system 186 provides customization based on an expert system's ability to handle information in a way that simulates a human expert.

FIG. 6: a flow chart of one embodiment of the expert system is shown. The expert system 186 is designed to act in a manner similar to a professional consultant. The expert system may proactively monitor 188 a structure for indoor air problems by controlling the air monitoring unit 102. The expert system 186 may also reactively diagnose 190 indoor air problems as suggested by symptoms disclosed by the user or occupant. When the expert system is operating in a proactive mode, data from the air monitoring unit may be utilized in the analysis.

In contrast, information regarding symptoms may be more important in the reactive mode. The proactive and the reactive methodologies lead to diagnoses and recommendations. These activities are followed by an audit trail activity in which users report on the effectiveness of the recommendations. This feedback may be used to track user satisfaction and/or to provide input to an automated learning mechanism in the expert system. User records may be updated to reflect the inputs, diagnoses, recommendations, and feedback for an entire session.

The expert system 186 may configure the air monitoring unit 102 for testing a building or structure. Configuration regime variables include which rooms to monitor, the total number of rooms/floors to monitor, duration of sample collection, and whether allergen or special purpose tests should be conducted. The expert system 186 may recommend differential weightings on the different sensors. For example, the expert system 186 may recommend that certain sensors be given more airflow or sampled more frequently than others.

With either a proactive or a reactive methodology, the user first orders an indoor air analysis such as through the website 166 in step 192. When the expert system 186 is used in the reactive mode, a user or occupant may report symptoms in step 194, and then the expert system may generate a report issuing a preliminary diagnosis in step 196 on the likelihood that indoor air quality is causing those symptoms, as opposed to organic or other causes. The expert system 186 may also report the likelihood of specific kinds of causes, e.g., VOCs, Fungi, etc. Although symptom information drives the preliminary diagnosis of

step 196, information about building characteristics, occupant characteristics, ongoing activities within the building, recent events and surrounding context can also be used. This information may be generated by having the user answer questions when opening their user account. The expert system 186 then suggests issues to be looked at in step 198 to help verify preliminary hypothesis generated in step 196. Sensor data is automatically analyzed relating to these issues in step 200, and an integrated diagnosis 202 is generated in step 202. Once the integrated diagnosis is generated, recommendations are made in step 204 for improving air quality in the building being analyzed.

The expert system 186 may also be used when symptoms aren't being experienced by building occupants. The expert system may provide a forecast of the future likelihood of indoor air-related symptoms within the building, given relevant information such as building-characteristics, occupant characteristics, ongoing activities, events, and context.

In the proactive mode, expert system 186 may recommend a test configuration and procedure in step 210 that defines among other aspects, which areas to be tested, for how long, with what sensors, using which special grab sample tests, and under what conditions. The air monitoring unit may then issue a preliminary diagnosis in step 212 based on sensor air quality parameter data received from the air monitoring unit 102, and the expert system 186 suggests issues to be looked at in step 214 based on analysis of the sensor air quality parameter data. The user may enter data regarding the occupants of the building and the building itself in step 216 and an integrated diagnosis is performed in step 218. The expert system then makes recommendations in step 204 for improving air quality in the building being analyzed.

The expert system 186 may receive feedback in step 206 on the effectiveness of its prior diagnoses in steps 202 and 218 and its recommendations in step 204. The user's record is then updated in step 208. This feedback in step 206 may allow the expert system 186 to track a user over time and to therefore provide “customized” servicing of that user. Moreover, this feedback may drive an AI-based learning mechanism in which the expert system 186 alters its processing based on an assessment of its previous to decisions.

The expert system 186 may contain many kinds of knowledge. One kind of knowledge the expert system may have is knowledge of the air monitoring unit 102 from which the expert system receives air quality parameter data. Since the expert system 186 knows about the air monitoring unit 102, the expert system may detect anomalies in is the air monitoring unit and recommend self-checks on the air monitoring unit.

FIGS. 7A and 7B: the expert system 186 is shown connected to the control unit 106 of the air monitoring unit 102. As shown, the expert system may be provided locally within the control unit.

The expert system may be “self-contained”. The expert system may be embedded within a series of web pages, but still may not be part of the main website and may be a mini-website relative to the main site.

The mini-website of the expert system 186 may have its own IP address and may be invoked directly from a Web browser. Preferably, controls may be put in place to prevent the mini-website from being accessible under normal circumstances. Instead, it is preferable that users interact with the main website and request expert system services as desired. One or more databases may support the expert system. The databases may hold data regarding an occupant, a building, current and historical air monitoring data and previous diagnosis, recommendations and user feedback, as well as other associated variables pertaining to a user.

The expert system may use any type of reasoning apparent to one of skill in the art, such as deductive reasoning, reasoning by analogy and fuzzy reasoning over patterns. With deductive reasoning, the expert system may infer the likelihood that various indoor air problems exist, given user data. Deductions may occur along a chain of “if-then” rules, the rules being the standard form of knowledge representation within expert systems. When using reasoning by analogy, the expert system may consult a database of standard Indoor Air Quality (IAQ) cases and find those cases that are similar to that of the user.

This kind of reasoning is called “by analogy” or “case-based” and the knowledge that underlies it “cases”. With fuzzy reasoning over patterns, the expert system may consult a library of anomalous patterns and compare those patterns to the air quality parameter data and grab samples. IAQ problems are inferred to exist within the data to the extent that the anomalous patterns fit the data. Perfect fits are not expected. The degree to which the patterns fit the data using techniques of fuzzy set theory are assessed.

All three types of reasoning or expert may exist separately or together for a given user. Each type of reasoning results in a probabilistic assessment of IAQ problems within user and sensor data. The results of each assessment under each type of reasoning may be combined into an overall assessment. This integration occurs via an AI architectural technique known as “Black boarding”. A blackboard is an event-driven data structure. The purpose of the blackboard is to allow each of the three reasoning methods to “post” its intermediate results to a common locale. In this way, each reasoning method can use the results of the other two methods, if desired. Other reasoning methodologies may be added to the expert system.

The expert system 186 may use the Web session as the “Blackboard”. Results from all the reasoning methodologies, which are commonly referred to as “experts” are posted to the Web session and are available for use by the other experts. Use of the Web session as the expert system blackboard is possible due to the use of AI libraries to model expertise, such that common I/O operations run across libraries, meaning that different experts can speak to each other even if they use different knowledge representation techniques. Objects may persist across Web

pages, such that the blackboard persists throughout the Web session. The Web session may opportunistically poll experts for answers, based on the dynamic gathering of information

The expert system may employ the knowledge of multiple experts or reasoning methods. These experts, due to the different methodologies they employ, may bring a diverse set of perspectives to the problem of assessing air quality. Thus, the expert system may be designed to incorporate multiple, cooperating experts, each of whom is expert yet approaches the same problem in different ways. From a process standpoint, each expert may be assigned to work on the entire indoor air quality problem versus having a different part of the problem be worked by a different expert or methodology.

The exact sensor patterns that are diagnostic of IAQ problems may be revealed from the data itself and added to the library of anomalous patterns that are specified analytically. To effect this, the expert system may contain a data mining capability. User data, such as air quality parameter data, may be mined for significant patterns, and when such patterns are deemed to exist, they may be incorporated into the live expert system. Typically, this would not affect the use of the expert system, such as having to shut the system down to rebuild. Data that has previously been compared to the expert system pattern library may be reanalyzed with new patterns, making the system appear smart as well as providing new insights into nagging customer problems.

Data mining is typically coupled with a learning mechanism. The expert system may mine for all new patterns but may only "learn" those patterns that are diagnostic of indoor air problems. For example, the audit trail facility in which users give feedback on prior diagnoses in step 206 acts as a "teacher". In other words, the expert system may mine for new patterns and may correlate all mined patterns with feedback given by users. Mined patterns that are correlated with assertions of "good" diagnoses may be learned, while patterns that are correlated with feedback of "bad" diagnoses may be forgotten. The learning mechanism goes beyond sensor air quality parameter data patterns. In fact, all three kinds of knowledge—rules, cases, and patterns—may be learned over time. For each of the three types of knowledge, user feedback may act as a "teaching" mechanism.

The expert system 186 may form the foundation of an IAQ scorecard 209. This scorecard may be analogous to the scorecards used by the mortgage industry. Within the mortgage industry, loan originators, the secondary mortgage market, and credit rating agencies all use scorecards to assess the credit worthiness of loan applicants. Scores produced by such scorecards are weighted combinations of credit attributes and therefore are a single number that represent credit worthiness. In a similar manner, an IAQ Scorecard may have a weighted combination of IAQ attributes.

An example of an IAQ scorecard might include three sub-indices. The first may be a rating of comfort and ventilation using such parameters as temperature, relative

humidity, and CO_2. A second may be a measure of the healthiness of the space or conversely the level of pollutants or contaminants in the air. This measure may involve measurements of gases such as carbon monoxide, VOC's, allergens, mold, etc. A third area may be used to cover operational issues such as energy efficiency or the usage of outside air. These areas or others may be used individually or combined in some weighted manner to create a single number index. The attributes and their weights may be guessed at prior to collection of data but most likely will be determined empirically.

As such, the expert system's data mining and learning capabilities may be critical to the construction of a scorecard that truly distinguishes “IAQ bad risks” from “IAQ good risks”. Finally, the IAQ scorecard may also take the numbers that are generated and aggregate them with other similar numbers. After a large enough database is generated, each individual user's IAQ score can be compared to others to generate a percentile result of how the particular analyzed building or room compares to other buildings within the same area or across the country. Since there are no official guidelines on IAQ parameters, this kind of comparative analysis or score can be useful to know how a facility is doing relative to other similar buildings in providing good air to its occupants. The expert system may then also recommend approaches based on a low score that should allow a building's score to be raised.

FIGS. 8A and 8B, air monitoring unit 102 may include a continuous or periodically sampled air parameter sensor 220 and grab sampler 130. The taking of a sample by grab sampler 130 may be triggered by the air monitoring unit 102 itself, based on monitoring by the air parameter sensor 220. Alternatively, the air parameter sensor 220 may be monitored by the website 166 through the Internet. A command transmitted from the website 166 through the Internet 178 to the air monitoring unit 102 may trigger the capture of an air sample so that a more detailed analysis of the air quality parameter can be performed. In either case, the taking of the grab sample is triggered when the parameter sensed by sensor 220 meets a predetermined criterion. It will be understood that the criteria for triggering the taking of the grab sample can be based on measurements by two or more sensors and/or on other information.

WE CLAIMS

1. My Invention "AIR QUALITY MONITORING DEVICE USING INTERNET OF THINGS (IOT)" is an air monitoring device is disclosed having an air monitoring unit with at least one sensor for measuring data of an air quality parameter and a computer for storing the air quality parameter data received from the sensor using internet of things (IOT). The invented device the air monitoring unit may use an installed or a portable system, or a combination of both, for measuring the air quality parameters of interest. A remote data center also provided, and the data uploaded to the data center from the unit by a communications media such as the internet of things (IOT). The Information or instructions may also be downloaded from the data center to the unit via the communications media for controlling or modifying the function of the unit. The invented Device the air monitoring unit may contain sensors, and a multiple tube and vacuum system used to transport samples of air to the air monitoring unit from one or more remotely located sampling locations. This air monitoring system may involve a star based tube structure or "octopus" type arrangement that uses many tubes each making a "office run" from the sampling location to the air monitoring unit and also to use a networked air sampling system that includes a common centrally located air monitoring unit containing one or more sensors.
2. According to claim1 # the invention is to a air monitoring device is disclosed having an air monitoring unit with at least one sensor for measuring data of an air quality parameter and a computer for storing the air quality parameter data received from the sensor using internet of things (IOT).
3. According to claim1,2 # the invention is to the air monitoring unit may use an installed or a portable system, or a combination of both, for measuring the air quality parameters of interest.
4. According to claim1,2,3 # the invention is to a remote data center also provided, and the data uploaded to the data center from the unit by a communications media such as the internet of things (IOT).
5. According to claim1,23 # the invention is to the Information or instructions may also be downloaded from the data center to the unit via the communications media for controlling or modifying the function of the unit.
6. According to claim1,2,5 # the invention is to the invented Device the air monitoring unit may contain sensors, and a multiple tube and vacuum

system used to transport samples of air to the air monitoring unit from one or more remotely located sampling locations.

7. According to claim1,2,4 # the invention is this air monitoring system may involve a star based tube structure or “octopus” type arrangement that uses many tubes each making a “office run” from the sampling location to the air monitoring unit and also to use a networked air sampling system that includes a common centrally located air monitoring unit containing one or more sensors.
8. According to claim1,2,5 # the invention is to a wherein the expert system generates the information, and is adapted to send the information to the air monitoring unit. The invention is to a wherein the expert system is adapted to send information to the air monitoring unit to command the air monitoring unit to take a grab sample.
9. According to claim1,2,4 # the invention is to a wherein the air monitoring unit includes operational parameters, and the remote data center is adapted to send information to the unit to change the operational parameters. The invention is to a wherein the air monitoring unit includes a program to instruct the air monitoring unit in measuring air quality parameter data, and the remote data center is adapted to send information to the air monitoring unit to change the program.
10. According to claim1,2,5 # the invention is to a wherein the air monitoring unit includes a set-up parameter, and the remote data center is adapted to change the set-up parameter in the air monitoring unit.

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Patent Title: AIR QUALITY MONITORING DEVICE USING INTERNET OF THINGS (IOT).

ABSTRACT

My Invention "AIR QUALITY MONITORING DEVICE USING INTERNET OF THINGS (IOT)" is an air monitoring device is disclosed having an air monitoring unit with at least one sensor for measuring data of an air quality parameter and a computer for storing the air quality parameter data received from the sensor using internet of things (IOT). The invented device the air monitoring unit may use an installed or a portable system, or a combination of both, for measuring the air quality parameters of interest. A remote data center also provided, and the data uploaded to the data center from the unit by a communications media such as the internet of things (IOT). The Information or instructions may also be downloaded from the data center to the unit via the communications media for controlling or modifying the function of the unit. The invented Device the air monitoring unit may contain sensors, and a multiple tube and vacuum system used to transport samples of air to the air monitoring unit from one or more remotely located sampling locations. This air monitoring system may involve a star based tube structure or "octopus" type arrangement that uses many tubes each making a "office run" from the sampling location to the air monitoring unit and also to use a networked air sampling system that includes a common centrally located air monitoring unit containing one or more sensors.

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(57) Abstract :
The present invention named SoniDBA • is the software product that renders sonification service to DBA. In other words, SoniDBA converts most recent database alerts into non-verbal sounds that are DBA-understandable. Thus SoniDBA helps database administrators to have real time monitoring of availability and performance of databases. The invention is cloud based which reaps benefits of cloud such as scalability, availability, fault tolerance, elasticity and eliminates time and geographical restrictions. The invention specifically targets DBAs with its sonification service that saves time and effort of DBAs. Traditional database alert messages take more time to comprehend than non-verbal sounds produced by SoniDBA. Thus it renders invaluable service to DBAs. Moreover, it can also help DBAs who are visually impaired.

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INNOVATION PATENT

Patent number: 2021100048

The Commissioner of Patents has granted the above patent on 10 March 2021, and certifies that the below particulars have been registered in the Register of Patents.

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Title of invention:

Analyzing patient health information based on IoT sensor with AI for improving patient assistance in the future direction

Name of inventor(s):

ANAND, SUJATHA JAMUNA; G., BAVANI; K, PRASANNA LAKSHMI; GURUSAMY, RAVIKUMAR; L., KARTHIKEYAN; M., SIVARATHINABALA; C., AMBIKA BHUVANESWARI; DHARMALINGAM, JAYAKUMAR; F., ANTONY XAVIER BRONSON; S., KALIAPPAN; V., BALAJI and S., ARUN

COMMONWEALTH OF AUSTRALIA AUSTRALIA PATENT OFFICE

Dated this 10th day of March 2021

Commissioner of Patents

PATENTS ACT 1990

The Australian Patents Register is the official record and should be referred to for the full details pertaining to this IP Right.

Australian Government

IP Australia

CERTIFICATE OF GRANT

INNOVATION PATENT

Patent number: 2021100048

Term of Patent:

Eight years from 6 January 2021

NOTE: This Innovation Patent cannot be enforced unless and until it has been examined by the Commissioner of Patents and a Certificate of Examination has been issued. See sections 120(1A) and 129A of the Patents Act 1990, set out on the reverse of this document.

Dated this 10th day of March 2021

Commissioner of Patents

PATENTS ACT 1990

The Australian Patents Register is the official record and should be referred to for the full details pertaining to this IP Right.

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3B. CATEGORY OF APPLICANT [Please tick (✓) at the appropriate category]

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✓	Small Entity ( )	Startup ()	Others ()

4. INVENTOR(S) [Please tick (✓) at the appropriate category]

Are all the inventor(s) same as the applicant(s) named above?	**Yes (✓)**	**No ()**

If "No", furnish the details of the inventor(s)

5. TITLE OF THE INVENTION

METHOD FOR DETECTING HEALTH CONDITION IN PLANTS USING AN AERIAL DEVICE BASED ON DEEP LEARNING APPROACH

6. AUTHORISED REGISTERED PATENT AGENT(S)	IN/PA No.	1744

पेटेंट कार्यालय
शासकीय जर्नल

OFFICIAL JOURNAL
OF
THE PATENT OFFICE

निर्गमन सं. 36/2020	शुक्रवार	दिनांक: 04/09/2020
ISSUE NO. 36/2020	FRIDAY	DATE: 04/09/2020

पेटेंट कार्यालय का एक प्रकाशन
PUBLICATION OF THE PATENT OFFICE

(12) PATENT APPLICATION PUBLICATION
(19) INDIA
(22) Date of filing of Application :09/08/2020

(21) Application No.202041034143 A
(43) Publication Date : 04/09/2020

(54) Title of the invention : CYBERSECURITY ANALYSIS TECHNIQUE TO DETECT POSSIBLE VIOLENT HUMAN BEHAVIORS

(51) International classification	:H04L63/1408
(31) Priority Document No	:NA
(32) Priority Date	:NA
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Filing Date	:NA
(62) Divisional to Application Number	:NA
Filing Date	:NA

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6)MR. PYDALA BHASHA
7)DR. KODE RAJIV

(57) Abstract :
Network security in the field of engineering and development is an important issue. This invention deals with this problem and provides an analyzed network security system. This invention tends to establish multiple nodes, where each node is a representation of some conditions in the network. Then, an estimate for nodes has been created, such that it has eased with the conditions in the network. To produce a compromise for the network threat, attack paths are generated connecting the nodes in that network. Next in the queue, the edge probabilities are calculated from the generated attack paths. The attack graphs are generated to identify the simplest and longest path that is available to compromise the cybersecurity threats and attack paths are aligned and it deviates for the same. Lastly, the events and conditions of the network are predicted using the physical sensors to detect an attack in the network. Once the attack is being confirmed, a response is generated as security alerts which reduce the risk of a security breach in the computer network security systems.

No. of Pages : 12 No. of Claims : 4

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शासकीय जर्नल

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पेटेंट कार्यालय का एक प्रकाशन
PUBLICATION OF THE PATENT OFFICE

INTRODUCTION

In view of the recent amendment made in the Patents Act, 1970 by the Patents (Amendment) Act, 2005 effective from 01st January 2005, the Official Journal of The Patent Office is required to be published under the Statute. This Journal is being published on weekly basis on every Friday covering the various proceedings on Patents as required according to the provision of Section 145 of the Patents Act 1970. All the enquiries on this Official Journal and other information as required by the public should be addressed to the Controller General of Patents, Designs & Trade Marks. Suggestions and comments are requested from all quarters so that the content can be enriched.

(Om Prakash Gupta)
CONTROLLER GENERAL OF PATENTS, DESIGNS & TRADE MARKS

22nd MAY, 2020

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EARLY PUBLICATION (MUMBAI)	**:**	**19437 – 19492**
EARLY PUBLICATION (CHENNAI)	**:**	**19493 – 19542**
EARLY PUBLICATION (KOLKATA)	**:**	**19543 – 19548**
PUBLICATION AFTER 18 MONTHS (DELHI)	**:**	**19549 – 19629**
PUBLICATION AFTER 18 MONTHS (MUMBAI)	**:**	**19630 – 19680**
PUBLICATION AFTER 18 MONTHS (CHENNAI)	**:**	**19681 – 19990**
PUBLICATION AFTER 18 MONTHS (KOLKATA)	**:**	**19991 – 20315**
WEEKLY ISSUED FER (DELHI)	**:**	**20316 – 20343**
WEEKLY ISSUED FER (MUMBAI)	**:**	**20344 – 20356**
WEEKLY ISSUED FER (CHENNAI)	**:**	**20357 – 20384**
WEEKLY ISSUED FER (KOLKATA)	**:**	**20385 – 20391**
APPLICATION FOR POST GRANT AMENDMENTS [PUBLICATION U/S 57(3) RULE 81(3)(A)](DELHI)	**:**	**20392**
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INTRODUCTION TO DESIGN PUBLICATION	**:**	**20430**
REGISTRATION OF DESIGNS	**:**	**20431 - 20464**

THE PATENT OFFICE
KOLKATA, 22/05/2020
Address of the Patent Offices/Jurisdictions
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2	The Patent Office, Government of India, Boudhik Sampada Bhavan, Near Antop Hill Post Office,S.M.Road,Antop Hill, Mumbai – 400 037 Phone: (91)(22) 24137701 Fax: (91)(22) 24130387 E-mail: mumbai-patent@nic.in ❖ The States of Gujarat, Maharashtra, Madhya Pradesh, Goa and Chhattisgarh and the Union Territories of Daman and Diu & Dadra and Nagar Haveli	5	The Patent Office (Head Office), Government of India, Boudhik Sampada Bhavan, CP-2, Sector –V, Salt Lake City, Kolkata- 700 091 Phone: (91)(33) 2367 1943/44/45/46/87 Fax: (91)(33) 2367 1988 E-Mail: kolkata-patent@nic.in ❖ Rest of India
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पेटेंट कार्यालय

कोलकाता, दिनांक 22/05/2020

• कार्यालयों के क्षेत्राधिकार के पते

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2	पेटेंट कार्यालय, भारत सरकार बौद्धिक संपदा भवन, एंटोप हिल डाकघर के समीप, एस. एम. रोड, एंटोप हिल, मुम्बई- 400 037, फोन: (91) (22) 24137701 फ़ैक्स: (91) (22) 24130387 ई. मेल: Mumbai-patent@nic.in ❖ गुजरात, महाराष्ट्र, मध्य प्रदेश, गोवा तथा छत्तीसगढ़ राज्य क्षेत्र एवं संघ शासित क्षेत्र, दमन तथा दीव, दादर और नगर हवेली.	5	पेटेंट कार्यालय, भारत सरकार कोलकाता, (प्रधान कार्यालय) बौद्धिक संपदा भवन, सीपी-2, सेक्टर- V, साल्ट लेक सिटी, कोलकाता-700 091, भारत. फोन: (91)(33) 2367 1943/44/45/46/87 फ़ैक्स:/Fax: (91)(33) 2367 1988 ई. मेल: kolkata-patent@nic.in ❖ भारत का अवशेष क्षेत्र
3	पेटेंट कार्यालय, भारत सरकार बौद्धिक संपदा भवन, प्लॉट सं. 32, सेक्टर- 14, द्वारका, नई दिल्ली- 110 075. फोन: (91)(11) 25300200, 28032253 फ़ैक्स: (91)(11) 28034301, 28034302 ई. मेल: delhi-patent@nic.in हरियाणा, हिमाचल प्रदेश, जम्मू तथा कश्मीर, पंजाब,राजस्थान, उत्तर प्रदेश, दिल्ली तथा उत्तरांचल राज्य क्षेत्रों, एवं संघ शासित क्षेत्र चंडीगढ़		

वेबसाइट: http://www.ipindia.nic.in
www.patentoffice.nic.in

पेटेंट अधिनियम, 1970 तथा पेटेंट (संशोधन) अधिनियम, 2005 अथवा पेटेंट (संशोधन) नियम, 2006 द्वारा वांछित सभी आवेदन, सूचनाए, विवरण या अन्य दस्तावेज़ या कोई शुल्क पेटेंट कार्यालय के केवल उपयुक्त कार्यालय में स्वीकृत होंगे।

शुल्क: शुल्क या तो नगद रूप में या Controller of Patents के नाम में देय बैंक ड्राफ्ट या चेक के द्वारा भेजी जा सकती है जो उसी स्थान के किसी अनुसूचित बैंक में प्रदत्त हो जहाँ उपयुक्त कार्यालय स्थित है ।

SPECIAL NOTICE

18 Months publication as required under Section 11A of the Patents Act, 1970 as amended by the Patents (Amendment) Act, 2005.

Notice is hereby given that any person at any time before the grant of Patent may give representation by way of opposition to the Controller of Patents at appropriate office on the ground and in a manner specified under section 25(1) of the Patents (Amendment) Act, 2005 read with Rule 55 of the Patents (Amendment) Rules, 2006.

Notice is also given that if any interested person requests for copies of the complete specification, drawing and abstract of any application already published, the photocopy of the same can be supplied by the Patent Office as per the jurisdiction on payment of prescribed fees of Rs.8/- per page. If any further details are required to be obtained, the same can be provided by the respective Patent Offices on request.

(Om Prakash Gupta)
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SPECIAL NOTICE

Under the new provision of the Patents Act, 1970 as amended by the Patents (Amendment) Act, 2005 and Rules there under, Publication of the matter relating to Patents in the Official Gazette of India Part III, Section 2 has been discontinued and instead The Official Journal of the Patent Office is being published containing all the activities of The Patent Office such as publication of all the patent applications after 18th months , grant of patents & all other information in respect of the proceedings as required under the provisions of the Patents (Amendment) Act, 2005 and Rules thereunder on weekly basis on every **Friday**.

The Journal is uploaded in the website every Friday. So Paper form and CD-ROM form of the Journal are discontinued from 01/01/2009.

SPECIAL NOTICE

Every effort is being taken to publish all the patent applications under section 11(A) of the Patents Act. However, if duplication of publication of any application is found, then earlier date of publication will be taken for the purpose of provisional protection for applicant and Patent Office will grant Patent not before six months from the date of second publication, provided that there is there is no third party representation.

(12) PATENT APPLICATION PUBLICATION
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(22) Date of filing of Application :04/04/2020

(21) Application No.202041014971 A
(43) Publication Date : 22/05/2020

(54) Title of the invention : DEVELOPMENT OF ROBOT FOR PIPELINE INSPECTION

(51) International classification	:G01M0003000000, F16L0055280000, B08B0009049000, F16L0055260000, F17D0005060000
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(57) Abstract :
The aim of this invention is to give an innovative concept to handle the inspection operations without human intervention inside the pipeline. Wheeled leg mechanism is employed in this design to go inside the pipe. The legs are circumferentially and symmetrically spaced out 128cm to 20cm apart. The robot is made flexible radially so that operator can adjust its legs according to the pipeline dimensions. This structural design makes it possible to have the adaptation to the diameter of pipe and to have adjustable attractive force towards the walls of pipe. In this invention, the condition of pipeline is captured with USB Camera and monitored on PC. The defects that occurred inside pipeline due to corrosion or aging of the pipeline is inspected and monitored by this robot. Pipeline inspection is must in oil, water and petro-chemical industries which prevents many hazardous accidents. The robot structure consists of power supply, SMPS and gear motors. Direct supply is given to gear motors using SMPS as its control centre enables the robot to work smoothly. The invention is intended to reduce the risk involved during the inspection operation by analysing the situation and also to provide an option to detect any leakage inside the pipe.

No. of Pages : 21 No. of Claims : 3

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PATENTS | DESIGNS | TRADE MARKS
GEOGRAPHICAL INDICATIONS

सत्यमेव जयते
GOVERNMENT OF INDIA

Controller General of Patents,Designs and Trademarks
Department of Industrial Policy and Promotion
Ministry of Commerce and Industry

Application Details

APPLICATION NUMBER	202041026640
APPLICATION TYPE	ORDINARY APPLICATION
DATE OF FILING	24/06/2020
APPLICANT NAME	1 . GURRAM VIJENDAR REDDY (ASSOCIATE PROFESSOR) 2 . DR RAMAN DUGYALA (PROFESSOR) 3 . MR. MAHIMA SHANKER PANDEY (ASSISTANT PROFESSOR) 4 . DR. ANKUR SINGH BIST (ASSOCIATE PROFESSOR) 5 . SHABNAM KUMARI 6 . DR. AMIT KUMAR TYAGI (ASSISTANT PROFESSOR (Sr.))
TITLE OF INVENTION	AADHAAR TRANSPORTS SECURITY: A NOVEL APPROACH TO PROVIDE RELIABLE AND SECURE SERVICES IN PUBLIC TRANSPORTS THROUGH AADHAAR.
FIELD OF INVENTION	COMPUTER SCIENCE
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E-MAIL (UPDATED Online)	
PRIORITY DATE	
REQUEST FOR EXAMINATION DATE	--
PUBLICATION DATE (U/S 11A)	31/07/2020

Application Status

			View Documents