Transfer The Levels Of The Monitored Carbon, Nitrogen Gases From The Industries

N. Nithiyanandam, K. Venkatesh, M. Rajesh

Abstract: Data transfer is very essential in the wireless sensor networks. The communications between the nodes are important because the loss of any data or changes created in the data may affect the entire progress. During the processing of the nodes for optimization the entire values obtained must be used and then obtain the best values out of them. Monitoring of the levels of the gas is done using the sensors and then they are communicated to the mobile nodes via the network. The levels of the gas in the industry are fatal when they reach their highest levels hence control and prevention is necessary. To monitor them the sensors are embed into the controller board and then the values are transferred. In case of the highest levels reached the broadcast message is sent to the centralized authority and to the common people in the neighboring locations.

Key words-- sensor, monitor and transfer, industry pollution.

I. INTRODUCTION

Wireless sensornetwork has a distributed sensor to monitor the physical and the environmental conditions and hence pass the data through the network. The development of wireless sensor networks was initiated for the military applications, today it is being used in industrial application, health monitoring etc. They are a collection of nodes connected directly or indirectly to the sensors. Sensor nodes are capable of processing the information and communicating with the nodes connected in the network.

CHARACTERISTICS OF WIRELESS SENSOR NETWORKS

- Ability to withstand the environment
- Mobility of the nodes
- Withstand failures
- Improved performance
- Easy access
- Low power consumption

POLLUTION

Pollution is introducing the pollutants into the natural environment that cause the undesirable change.

The pollutants may be substances that are naturally occurring contaminants. The release of the gas pollutants has a serious impact to the environment.

Industrial pollution

The industrial pollution is the corruption of the environment by the factories; dump the waste products into the air and water.

Here in the industrial application, air pollution has a major drawback that affects the natural environment as well as the health. The industrial wastes such as the smoke, organic and inorganic substances toxic gases, dust may have serious impact in them.[5]

Generally the industrial wastes are given as

1. Process waste
2. Chemical waste

Process waste

The process wastes in the industry were the organic and inorganic waste are usually toxic to the living organisms. They are the solid waste released by the industries in their processing and packing.

Chemical waste

The chemical wastes are the substances that are produced as a by-product in the products. They include the wastes from fertilizers, paper and pulp industries etc.

Effects of industrial air pollution

- Damage the internal organs
- Irritation to eyes, nose, throat, respiratory tracts etc.
- Mortality and morbidity
- Chronic diseases
- Poisoning

DETECTION OF THE HARMFUL GAS RELEASED IN THE ENVIRONMENT

The air pollution sensors are useful to detect the various types of gases emitted into the environment. They detect and monitor the availability of the substances in the air. The main focus is on the five components such as

- Ozone
- Particulate matter
- Carbon monoxide
- Nitrous oxide
- Sulfur dioxide.

GAS DETECTORS

The gas detectors are used to detect the presence of the gases in the area, as the part of the safety system. This is shown in the figure1.1. They may be useful along to detect the gas leak or other emission. They can detect the combustible, flammable or toxic substances being leaked. These sensors has a wide range use in industrial plants, refineries, pharmaceutical manufacturing, paper pulp mills, aircraft and ship-building facilities, vehicles.[3]

Revised Manuscript Received on March 25, 2019.

N.Nithiyanandam, Vel Tech Rangarajan Dr.Sagunthala R&D Institute of Science & Technology, India

K.Venkatesh, Vel Tech Rangarajan Dr.Sagunthala R&D Institute of Science & Technology, India

M. Rajesh, KRS College of Engineering, India

Figure 1.3 Gas detecting sensor

Features

- Portable
- Cost effective
- Increased performance
- Controlled operations

Types of gas detectors

The detectors are being classified based on the operation mechanism. They are broadly given in two factors.

- Portable detectors
- Fixed gas detectors

Portable detectors operate with the battery. They use the audio signals and visible signals for alarms and flash lights when harmful levels are detected.

Fixed type gas detectors may be used for one or more gas types. They are generally fixed on continuous monitoring.

The various effects of the harmful gases such as carbon monoxide, nitrogen and methane are given as follows.

Carbon monoxide

The harmful gas may be caused because of the various factors such as indoor pollutants and outdoor pollutants. Their effects are described based on their volume as shown.

Table 1.1 Effects of carbon

Volume(ppm)	Effects
350-450	Atmospheric concentration
600-800	Acceptable level
1000	Tolerable
5000	Average exposure limit over 8 hours
6000-30,000	Short exposure
3-8%	Increased respiratory rate
>10%	Nausea, vomiting, unconsciousness
>20%	Unconsciousness, death

Nitrogen

Displaces the oxygen and creates oxygen deficiency lesser than about19.5%. The liquid nitrogen is usually colorless and odorless. The variation in the oxygen is responsible for the effect caused.

Table 1.2 Effects of nitrogen

Oxygen content	Effect
21%	Normal breathing
17%	Vision impairment
12-16%	Increased heart rate/ labored breathing
11-14%	Fatigue, heart injury, fainting
8-11%	Fainting, nausea, vomiting (painless dying)
6-8%	Heart beats only a few minutes
0-6%	Faint, immediate comma, respiratory arrest, immediate death

Methane

The methane is a natural gas that are available naturally in the environment. It is a colorless and a odorless gas. The level of intake when increased leads to nausea, vomiting, fatigue.

II. RELATED WORK

The carbon emission is monitored in the urban regional transportation that may have early warning evaluation. This may use the particle swarm optimization along with the support vector machine. [4]

Indoor monitoring is the real time measure of the air quality inside particular locations. The monitoring of the gas may be transferred along using the wireless sensor networks. [9] The early carbon detection that may be captured and stored are identified in their leakage and processed using their gas differential ratio values. They can monitor both the soil and atmospheric carbon concentrations. [8]

The real-time Wi-Fi based method used to transfer the carbon mono oxides that are sensed. the sensors are constructed based on the NDIR technology. The transfer is done along to the PC or to the smart phones. [6]

Nitrogen levels in the soil are usually greater than the content in water. An average of about 20-30% of nitrogen is essential in the soil. Lowered levels as well as the increased proportion may be fatal. There is possibility of severe fire also in the increased content. [10]

III. EXISTING SYSTEM

The current system may be used to monitor the various gas levels and hence transfer data through the static nodes in the network. The system has its application in the climatic change control. They detect the CO_2 ratios by analyzing the differential ratios in the form of O_2/CO_2 relation. The data are then combined with the GPS to identify the gas leak. The reference gases are being passed with them and the actual concentration is being measured. They have a feasible in detecting the leaks. The validity of the process is measured using the gas differential concentration ratio.[11]

The capture and storage sites leaks can be detected at local sites by monitoring atmospheric CO_2. They use the tracers at all scales to identify the strategies of the CO_2.

Drawbacks of the existing system:

- Static nodes are used.
- Cannot be effective to communicate with all neighbors.
- Used for a single type of detection.

PROPOSED SYSTEM

The proposed work uses the particle swarm optimization technique that is more effective to transfer data at a faster rate to its neighbors. Particle swarm optimization (PSO) is a method that computes and optimizes a problem by improving the candidate solution with regard to a given measure of quality. It solves a problem by having a large population of candidate solutionsand moving these particles around according to their simple formula over theirposition and velocity of the particle. Each particle's movement is inclined by its local best position and it is also guided toward the best known positions in the search-space, that may be updated as better positions are found by other particles. This is expected to move the swarm toward the best solutions.

Algorithm

The particle swarm algorithm begins by creating the initial particles, and assigning them initial velocities.

- Evaluates the intent function at each particle location, and determines the lowest function value as the best value and thencalculate its best location.
- Chooses new velocities based on the current velocity of their neighbors.
- Updates iteratively the particle locations i.ethe new location is the old one plus the velocity of the modified one to keep particles within bounds, velocities, and neighbors.
- Iterations proceed until the algorithm reaches a stopping criterion.

Neighborhood and topologies

The topology of the swarm defines the subset of particles which each particle can exchange information. The basic version of the algorithm uses the global topology as the communication structure for the swarm. They allow all the particles to communicate with all the other particles, thus the whole swarm share the same best position g from a single particle. [15]

However, this approach might lead the swarm to be trapped into a local minimum, thus different topologies have been used to control the flow of information among particles. For example, thelocal topologies, particles share the information with a compartment of particles.

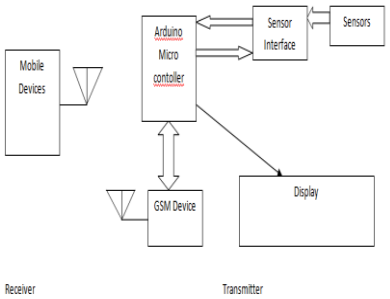
This subset an be a geometrical one – for example "the *m* nearest particles" – or, more i.e. a set of particles that is not depending on any distance.During such cases, the PSO variant is said to be local best (vs global best for the basic PSO).

SENSORS FOR MONITORING THE GASES

Carbon dioxide is a colorless and odorless gas and is toxic if present in high levels. Carbon Dioxide sensors are devices used to measure the amount of carbon dioxide present in air or in a product. These sensors quantify the amount of the gas in parts per million (ppm) or by percentage volume. They are often used in buildings or houses for maintaining the indoor air quality.

IV. ARCHITECTURE OF THE PROPOSED SYSTEM

- The architecture for the proposed system is consisting of the modules for the data transmission that has the sensors as the mobile devices that are portable.



.

Figure 4.1 Architecture Diagram

- The micro controller is connected via the interface. The GSM is used to communicate the nodes in the transfer.

They are now displayed as an alert using the display unit for their creation

MODULES

- Sensor interfacing
- Transmission of data

Sensor interface

The sensor interface is used to monitor the various gases that may be used in the industry. The monitoring is essential because the damage caused by the excess of the gas particles may cause severe effects in the human. Thus the monitoring and control is required for the industrial application.

The interface is used to communicate the sensors along with the network modules for communication the nodes to transfer the data sensed between them.

Transmission of data

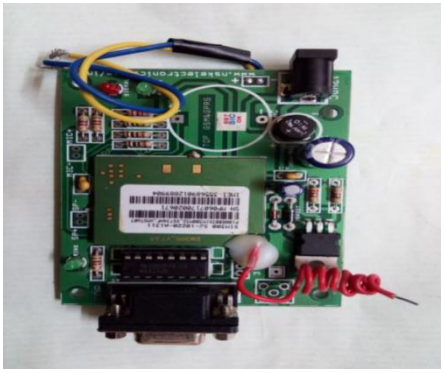
Data transfer is done to send the monitored data that was sensed using the sensor and hence transfer them into the network as an alert to the rise of the gas levels. This may help the people in the surrounding places where industries are located.

V. IMPLEMENTATION

The aurdino microcontroller boards are used that may be more useful tool for the implementation.

The sensor is used to monitor the level of the gases that may be connected to the network via the gsm.

The sensor may be used to measure the gas that may have a display unit to show the ranges of values. The optimized values of the gas are being transferred to the administrator and to the neighboring location people as an alert during the higher values attained.



VI. CONCLUSION

The module for the transmission of the data is given such that all the neighbor nodes receive the data in a faster manner than the others. They are given such that the processed data may be given as an alert to the members or to the people in the surrounding locations. Thus this may be useful for the industries to monitor and control the harmful gas emissions.

REFERENCE:

1. AhmadrezaEjraeiBakyani, Hamed Sahebi, Mohammad M. Ghiasi, NavidMirjordavi ,FeridunEsmaeilzadeh, Moonyong Lee, Alireza Bahadori, (2016) " Prediction of CO2–oil molecular diffusion using adaptive neuro-fuzzy inference system and particle swarm optimization technique" research gate, Elsevier,Vol. 1,No.178–187.
2. Chen G, Fu K, Liang Z, Sema T, Li C, Tontiwachwuthikul P, et al.(2014) The genetic algorithm based back propagation neural network for MMP prediction in CO2-EOR process.Fuel;126:202–12.
3. Gas detection wikipedia.
4. Hao Wu, Xianglian Zhao, (2016) "Carbon Emission Early Warning System Modeling and Simulation Study of Urban Regional Transportation", International Journal of Smart Home Vol. 10,No 8, No. 271-280.
5. Industrial pollution wikipedia.
6. JiachenYang ,Jianxiong Zhou , ZhihanLv, Wei Wei and Houbing Song (2015) "A Real-Time Monitoring System of Industry Carbon Monoxide Based on Wireless Sensor Networks", Sensors No. 29535-29546
7. Myers, M., L. Stalker, B. Pejcic, and A. Ross,(2013)" Tracers—Past, present and future applications in CO2 geo sequestration. Appl.Geochem".Elsevier,Vol. 30,No. 125–135.
8. Nasrin Mostafavi Pak, Ofelia Rempillo, Ann-Lise Norman, and David B. Layzell, (2016)"Early atmospheric detection of carbon dioxide from carbon capture and storage sites", journal of the air & waste management association Vol. 66, No. 8, 739–747.
9. Petros Spachos, Member, IEEE, and DimitriosHatzinakos,(2016) "Real-Time Indoor Carbon Dioxide Monitoring Through Cognitive Wireless Sensor Networks", IEEE sensors journal, vol. 16, no. 2, 506-514.
10. Robert W. Howarth, Peter M. Vitousek (2001) "biogeochemistry" Issue 13: 87-115
11. Shuqing Han, Jiajia Liu, Mengshuai Zhu, Chen Shen, and Jianhua Zhang,(2016) " Advancement and Trend of Nondispersive Infrared Carbon Dioxide Sensor", 3rd International Conference on Materials Engineering, Manufacturing Technology and Control, No. 1757-1761.
12. Sira Srinives ,Tapan Sarkar , Raul Hernandez, Ashok Mulchandani, (2015)"A miniature chemiresistor sensor for carbon dioxide", Article in Analytica Chimica Acta, Elsevier.
13. Tharanivasan AK, Yang C, Gu Y.(2013) "Measurements of molecular diffusion coefficients of carbon dioxide, methane, and propane in heavy oil under reservoir conditions". Energy Fuels 2006;20:2509–17.
14. White, C.M., B.R. Strazisar, E.J. Granite, J.S. Hoffman, and H.W. Pennline. (2003)"Separation and capture of CO2 from large stationary sources and sequestration in geological formations—coalbeds and deep saline aquifers". J. Air Waste Manage. Assoc.
15. Willms, J.R., A.N. Dowling, Z.M. Dong, S. Hunt, B.J. Shelp, and D.B. Layzell.. The simultaneous measurement of low rates of CO2 and O2 exchange in biological systems. Anal. Biochem. 1997.
16. Rajesh, M., and J. M. Gnanasekar. "Path Observation Based Physical Routing Protocol for Wireless Ad Hoc Networks." Wireless Personal Communications 97.1 (2017): 1267-1289.
17. Rajesh, M., and J. M. Gnanasekar. "Sector Routing Protocol (SRP) in Ad-hoc Networks." Control Network and Complex Systems 5.7 (2015): 1-4.
18. Rajesh, M. "A Review on Excellence Analysis of Relationship Spur Advance in Wireless Ad Hoc Networks." International Journal of Pure and Applied Mathematics 118.9 (2018): 407-412.
19. Rajesh, M., et al. "SENSITIVE DATA SECURITY IN CLOUD COMPUTING AID OF DIFFERENT ENCRYPTION TECHNIQUES." Journal of Advanced Research in Dynamical and Control Systems 18.
20. Rajesh, M. "A signature based information security system for vitality proficient information accumulation in wireless sensor systems." International Journal of Pure and Applied Mathematics 118.9 (2018): 367-387.
21. Rajesh, M., K. Balasubramaniaswamy, and S. Aravindh. "MEBCK from Web using NLP Techniques." Computer Engineering and Intelligent Systems 6.8: 24-26.