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Review on Environment Monitoring System and Energy Efficiency

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ABSTRACT
The Environment monitoring is one of the applications of wireless sensor network. The most serious environment pollution is air pollution because different air pollutant causes damage to human health and causes global warming. To avoid such effect on human health and climate change Environment monitoring systems are used. This paper provides the short overview of different environmental air pollution monitoring systems and Energy efficiency in WSN to reduced the power consumption of system.
Keywords – Environment monitoring system, Energy efficiency, Wireless sensor network

I. Introduction

One of the greatest problems that the world is facing today is that Environmental pollution. It consists of soil, water and air pollution. The first and foremost Environmental pollution is air pollution which causes Global warming and Climate change. It also affect on human health.

Environment monitoring is one of the major application of wireless sensor network.WSN consist of different sensors which are widely distributed to monitor different environment parameters like temperature, humidity, gases, pressure , wind speed etc.

WSN consists of sensor nodes which are low cost devices with limited power. Energy efficiency is the biggest problem when these sensors are used for large scale environment monitoring as the sensors are battery powered. Therefore it is necessary to improve the energy efficiency of monitoring system. Several techniques are used to improve the energy consumption. This paper performs the review on different environmental air pollution monitoring systems and techniques to improve the energy efficiency of the system.

II. Literature Review

2.1 Environment monitoring system: Review

Nihal Kularatna and B.H.Sudantha [1] presented environmental air pollution monitoring system in 2008.The system based on the IEEE 1451 standard. In this paper STIM smart transducer interface module was developed which consist of microcontroller and group of various sensors like CO2, CO, NO2, O3.This also used Personal computer PC for graphical representation. STIM connected to the PC via transducer independent interface which uses IEEE 1451 standard.

Y.J.Jung and Y.K.Lee [2] developed air pollution monitoring system using Geosensor network in 2008.Geosensor network is used to the detect the condition of remote place. In this context model and concept of flexible sampling interval change was introduced to increases the battery lifetime. Context model designed which determines the polluted areas and accordingly alarm message and safety guidelines send to the people in that area.

Octavian A.Postolache, J.M.Dias and P.M.B Silva Girao [3] in 2009 implemented Smart sensor network for indoor and outdoor air quality monitoring. In this system sensor nodes are installed in different rooms and it consist of tin dioxide sensors which was hardwired or wirelessly connected to the central unit. It also measured the concentration of temperature and humidity for accuracy. In this the concept of multiple input single output neural networks was implemented to compensate temperature and humidity influence on gas concentration. Wi-Fi technology was used for communication.

In the year of 2010 A.R.Al-Ali, Imran Zualkernan and Fadi Aloul [4] introduced Mobile GPRS sensors for pollution monitoring. This included Data acquisition unit, GPRS modem, and GPS module and pollution server. In this DAQ unit, GPRS and GPS were connected to the microcontroller via RS-232 Interface and finally gathered data were sending to the pollution server.

Raja Vara Prasad et al. [5] In 2011 proposed a real time wireless pollution monitoring. This system was based on the multihop data aggregation algorithm. Calibrated gas sensors were interfaced to wireless sensor motes, in that Libelium WASP mote was used which consist of processing unit and communication unit. All gas sensors were connected to sensor board on rotational basis. The collected data were sending

to base station. Multihop data aggregation algorithm was used to increase a monitoring range.

Jen-Hao Liu et al. [6] Introduced micro-scale air quality monitoring system for urban areas in 2012.This System monitors the concentration of carbon monoxide co caused by heavy vehicles emission. Sensor nodes were deployed in highly populated areas. System was integrated with the GSM for data transmission.Gateway collected the data from all sensor nodes and sends to control centre by GSM network

Anuj Kumar et al. [7] in 2013 conducted a review on environmental monitoring system. The review discussed different techniques and various hardware used in the environment monitoring systems. It also considered the parameters like low cost, low power consumption, reliability, and signal to noise ratio and RF interference.

Abdullah Kadri et al. [8] in 2013 presented real time air pollution monitoring based on Machine to machine communication. The system was implemented with various monitoring station which consist of different gaseous and meteorological sensors. Each monitoring station communicates with the backend server through M2M communication which uses GPRS network.

2.2 Energy Efficiency in WSN: Review

Wendi Rabiner Heinzelman et al.[9] in 2000 proposed energy efficient communication protocol for wireless micro sensor network.This paper discussed the LEACH (Low energy adaptive clustering Hierarchy) protocol that distribute energy among the sensor in the network. LEACH can reduced the more power consumption compared to routing protocol.

Jamal N.Al-karaki and Ahmed E.Kamal [10] presented a survey on Routing techniques in wsn in 2004.This paper performed review on routing techniques in WSN. This paper presented routing challenges and design issues in wireless sensor network. It also introduced routing protocol in WSN which are divided into flat based routing; hierarchical based routing and location based routing

Ridha Soua and Pascale Minet [11] conducted a survey on energy efficient techniques in 2011.In environment monitoring application energy consumption is the major problem because it is impossible to use batteries for large scale application. Therefore in order to increase the lifetime of network, this paper discussed the data reduction, control reduction, topology control, energy efficient routing techniques.

Sandra Sentra et al. [12] introduced power saving and energy optimization techniques in 2011.This paper explained the hardware architecture for energy aware sensor deployment and energy parameters are considered in the transmission system.

Fahed Awad et al. [13] introduced power saving technique in 2012.The main focused on the clustering algorithm to minimize the power consumption. Clustering protocol uses the sensing coverage matrix. In this principle of virtual field force is applied on each cluster in a network that made the sensor node to move to proper location to maximize the sensing coverage and reduced the transmitted power.

III. Conclusion

It has been observed that wireless sensor network based environment monitoring systems are low cost, small size and easily reliable. But these systems cannot be used for large area because each node is usually energized by energy limited battery. This paper performs review on environment monitoring systems and different techniques to improve the energy consumption .so that in future this systems are used for large scale environment monitoring .This WSN based monitoring systems can also be used in habitat monitoring , indoor living monitoring , forest monitoring .

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