AN OVERVIEW OF SENSOR NODES FOR WIRELESS SENSOR NETWORK APPLICATIONS: A REVIEW

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Abstract: It is found that, the industrial sector is demanding sophisticated electronics system, wherein the industrial parameters should be centrally monitored. The industrial parameters such as environmental humidity, temperature, leakages of hazardous gasses from process plants etc are widely distributed and depict spatio-temporal variations. The industrial environmental pollution monitoring has global significance. Therefore, emphasizing present needs of the industries, it is essential to develop the Wireless Sensor Network (WSN), wherein typical industrial parameters are precisely monitored at central station. In fact, the WSN consists of autonomous sensor nodes, battery powered, connected to the base station using wireless networking topology. Deploying a ubiquitous embedded technology the sensor nodes of required features can be designed. Recently, ARM technology is resulting into the microcontrollers of promising features, deploying which the wireless sensor node can be designed. The WSN is used to monitor typical parameters of the dedicated industries and design issues od the sensor nodes are presented in this paper. Present research work encompasses the field such as WSN, sensor node, Zigbee, IEEE 802.15.4, embedded design etc. Therefore, these fields have been extensively studied and presented in this paper.

Keywords: Sensor nodes, Wireless Sensor Networks, Microcontroller, Zigbee etc.

1. Introduction:

Indeed, the Wireless Sensor Network (WSN), the realization of distributed architecture, is an innovative field to ensure Site Specific Data Management (SSDM). Industrial sector reveals the spacio- temporal variance in case of various physical as well as chemical parameters. In case of industry the parameters such as, the process parameters and environmental parameters are of great interests. The physical parameters such as temperature, relative humidity, concentration of typical gases in the air etc and chemical parameters such as pH of the solution, salinity of the water etc must be monitored and controlled to the desired level to increase the productivity without compromise in the quality. In case of typical industry both indoor as well as outdoor environment must be monitored and controlled. For collection of the data of industrial parameters of Site Specific variability, the Wireless sensor network is most suitable.

On extensive study of the literature and survey of the industries, such as Sugar industry, Alcohol industry, Textile industry, milk processing, food processing industry, paper and pulp making industries etc, it is found that, the sophisticated industries are demanding an electronic system of a great preciseness and reliability to monitor and control the various parameters. Typical industries such as power generation plants are availing DCS or SCADA systems of networking to collect the information of the parameters. However, these are wired networks. Such architecture depicts the complexity in the hardware and hence hard to debug the faults. Moreover, the power consumption and power loss is also significantly high. To overcome the problems of wired networking and to ensure sophistication in data collection and dissemination, the industries are demanding Wireless Sensor Network. Thus, on extensive survey of various industries, it is found that, the industrial sector is demanding sophisticated electronics system, wherein the industrial parameters are centrally monitored. It is also found that, at present some industries are using the wired network for measurement of parameters and controlling of the process. This wired network ensures the mesh of wires from place of data to the controlling base station and the physical connection are complex. Therefore, debugging and fault finding becomes troublesome. To avoid this problem many times the standby network is also suggested. This wired network not only increases the complexity but also exhibit tremendous loss of power for transmission of signal through the transmission lines. Secondly, transmission signal through wire is the one of the causes to introduce the noise, which reduces the signal to noise ratio. To avoid these problems of industrial sector, the wireless communication is most suitable technology. A wireless sensor network is suitable to replace the present wired network.

In fact, the WSN consists of autonomous sensor nodes, battery powered, connected to the base station using wireless networking topology. To ensure reliability in WSN, the sensor node must be highly reliable and precise. Moreover, it should low power and low cost device. Presently an embedded technology is becoming more ubiquitous and can be deployed to design sensor nodes of required features. Recently, ARM technology is resulting into the microcontrollers of promising features, deploying which the wireless sensor node can be designed. Moreover, the 32-bit philosophy of ARM processor helps to enhance the preciseness in the monitoring of the parameter values. The Zigbee technology is pervasively advancing. It can be used to ensure wireless communication. Therefore, to overcome present day problem of industrial sector and to ensure wireless data transfer with high accuracy and reliability, it is essential to design Wireless Sensor Network and implement the same for industrial environmental monitoring.

2. Review of Literature

Indeed, the Wireless Sensor Network (WSN) is an emerging field of electronics, ensuring research of applied nature. The salient features of wireless sensor network motivate to undertake the research work in this field. According to the architecture, the wireless sensor network (WSN) consists of a thousands of self-organizing, lightweight sensor nodes, which are used to monitor physical or environmental conditions. Normally, the parameters considered for monitoring include temperature, sound, humidity, vibration, pressure, gases, motion etc [1]. Each sensor node in a