

Employee and Workspace Safety using WSN

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ABSTRACT

This paper provides an effective study of Wireless sensor network for air quality management for safety of user microcontrollers and sensors. It also discusses about the requirement of wireless nodes which keep monitoring of work place continuously for ensuring the security of both the employees as well as environment. Its advanced technology is already been applied in many fields. This paper focuses on the application of wireless sensors in various industries, and designs a set of security monitoring and alarm system using WSN network and GPRS network.

Keywords: WSN network, GPRS network

I. INTRODUCTION

Nowadays, the vast use of real applications and challenges favor the use of “Wireless Sensor Networks” primarily as they are more efficient and cost effective as compared to alternative approaches. This characteristic of Wireless Sensor Networks allows them the capability to deploy sensor vectors under various circumstances in military and civilian applications.

Many industries are part of a developing country. Like Petroleum and chemical industry as a very important pillar of the national industry, is an important support for the national economic take-off, but also is the country's key projects to achieve industrialization. Because of the increased demands of chemical and petroleum products in different fields,

all kinds of dangerous products and high-pressure equipment must be installed and produced, so the safety of petrochemical plants is also very important.

WSN: Wireless sensor network (WSN) can be described as a group of dedicated and spatially dispersed sensors used for the purpose of monitoring and recording the physical conditions of the environment and then organizing the data which is collected at a central location. WSN measures different environmental conditions such as temperature, sound, pollution levels, humidity, wind, and so on. The Wireless Sensor Network consists of nodes which can range from a few to even thousands, where each node is connected to sensors. Each of such sensor network node consists several parts which includes a radio transceiver with an antenna (internal or external), a microcontroller, an electronic

circuit for the purpose of interfacing with the sensors and an energy source, which is generally a battery.

Data processing Issues require a massive processing capability, expertise in computing and a large amount of resources to perform computation and operations.

Parallel processing of data from WSN is effective way to handle this issue.

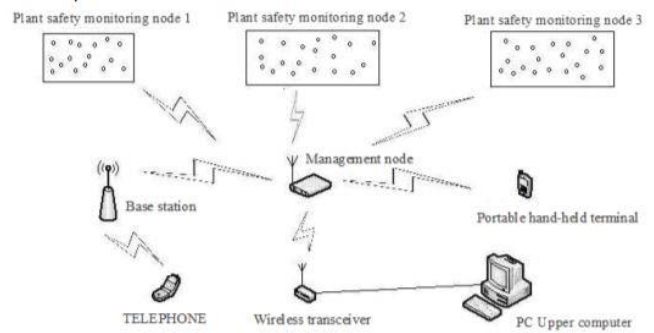


Fig 2. Overall Structure

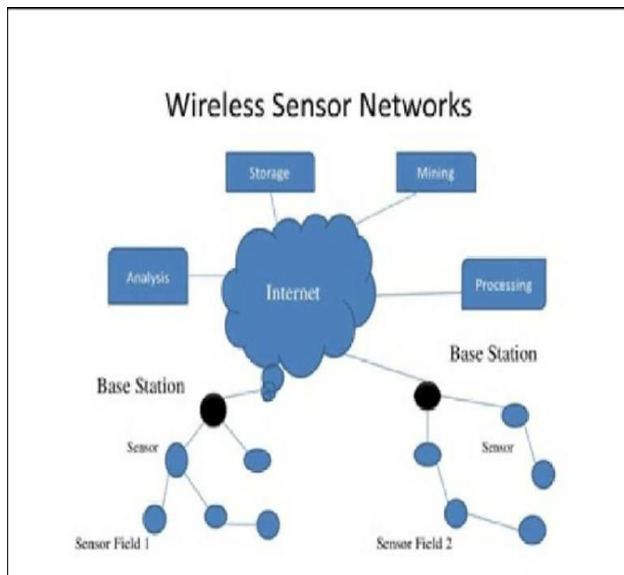


Fig 1. Wireless Sensor Network

II. GENERAL DESIGN

The structure of the alarm system and safety monitoring in petrochemical industries consists of two parts, first part is the internal network equipment, which includes security detection node, transceivers, upper computer, portable terminal management node (hand held); and the other part is the network equipment which includes a base station and GPRS remote terminal. The figure below shows the overall structure of the system.

The details of the danger information and environmental parameters can be gathered by querying the equipment, the combustible gas sensor immediately detects if the combustible gas exists in the field, sensor, then detects concentrations will be compared with the set value, if it is excessive, it is immediately reported to the concerned authorities, will measure the results sent to the upper computer at the same time and then show the location information and concentration size, and then the base station signal will be sent to devices in the form of textual messages.

When some other kinds of dangerous situations occur, the field nodes will be tested in similar ways. The position of the query and the specific parameters to be checked can be input by the key through the portable handheld terminal if the factory staff want to understand the situation, then the corresponding node will be real-time parameters sent to the portable terminal.

(1) Plant safety monitoring node: Plant safety monitoring node is similar to skin on human body which from time to time comes in contact with the external environment, it has the ability to perceive the information of the working environment of the plant area. It consists of various sensors such as humidity sensor, smoke sensor, temperature sensor, combustible gas sensor and camera, etc.

(2) Management node: The management node is mainly composed of wireless transceiver module, power module, GPRS module microcontroller.

(3) Portable hand-held terminal: It is used to check the field parameters and receive alarm information in the network.

(4) PC upper computer: The data command and wireless transceiver device can be connected to the data transmission by the RS232 serial port through the management software On the PC upper computer. The security detection and the alarm system interface of the upper computer is prepared based on the VC 6, insert MSCOMM serial communication control can achieve PC serial communication.

(5) GPRS remote terminal: GPRS remote monitoring is mainly refers to carry the mobile phone or any other connectable device, the environmental parameters of the scene can be queried and the alarm information can be received in any location through the phone or device.

III. POSSIBLE THREATS AND THEIR SECURITY MEASURES

One of the most dangerous attack of this category is the Sleep Deprivation Attack is in which intruders cause random drainage of sensor node batteries in order to shorten its lifetime dramatically. The network itself will be prolonged by detecting the SPA lifetime of a sensor nodes batteries. To compare values with predefined parameters to see if there are any intruders who are trying to harm the network and when found those malicious nodes are excluded Anomaly detection is used.

The DoS attack is another frequent attack, for the prevention of the DoS attack we introduce one interesting protocol. It should be mentioned that we have two types of the DoS attacks, nodes which uses network for its own purposes and communication (passive attacks) and harming other nodes unintentionally, and the malicious nodes that intentionally have a will to harm other nodes by not using the energy efficiently (active attacks). As it is in WSN, nodes need to forward messages to other nodes but in some cases, they cannot do that. This protocol acts as a game theory so that it is able to recognize those nodes that could act maliciously.

IV. CONCLUSION

Based on the alarm system and security detection application, it combined with the current management situation of various factories, designs a set of alarm system and security monitoring of plants, which includes portable handheld terminal, plant security detection node, GPRS remote terminal four parts and upper computer. The system has the function of preventing gas-leakage, fire prevention, and obtaining the spot monitoring parameters and image information at any time and at any time, it can

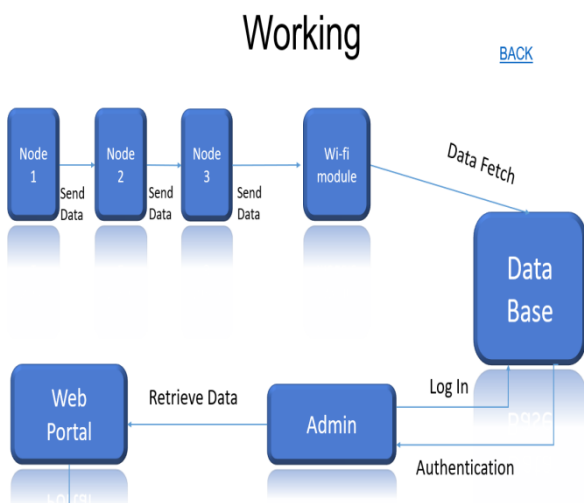


Fig 3. Basic Working module

effectively improve the safety management of the plant in the plant and even prevents theft. By this use of technology, we can protect the factory employees and the safety of public property.

V. REFERENCES

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