Hazardous Area Monitoring for Industrial Plant Powered by IoT

INTRODUCTION

In some industrial plants, there are some areas which are to be monitored time to time. Sometimes the conditions may become critical which may lead to loss of property and also human loss. To monitor the conditions we can integrate the smart devices in the areas which are needed to be monitored. Every device will be acting as a beacon and is connected to temperature sensors. We can broadcast the temperature data along with the location of that particular area through beacons.

Industrial accidents are as old as industry itself and so are preventive measures. The Standards for Explosive Areas or Atmospheres have also has evolved diversely worldwide, based on the local needs of the industries for the overall safe operation of the plants Explosion and an fire are two of the major constituents of these mishaps. Depending upon the environment, these can be termed 'Accidents' or fade away as simply the incidents' or 'Near Misses' in the safety officer's statistics. The first step to logically is to start defining and understanding some of the terms used in the whole scope of the loss prevention in accidents due to explosion and fire.

[1]Industrial Internet of Things for Safety Management Applications: A Survey.

The proliferation of the Internet and network-connected devices across all spheres of life in the modern-day world and the rising demand for a formal relatable paradigm led to the emergence of Internet of Things (IoT). [1].The end-point and the intermediate nodes in this rapidly increasing, dense, and complex network of devices – both regular and low-powered – are increasingly becoming smart, intelligent, and almost autonomous. These interconnected smart devices interact and communicate to transfer data to the central servers through the Internet and make use of the various technologies associated with the Internet.

ADVANTAGES: IoT device is used to predict the hazardous waste and hazardous air release by the industrial plant. It used to predict the accidents and we can able to rescue.

DISADVANTAGES: Industrial plant releases waste water in river/lake and pollutant air in atmosphere that pollute the environment but sometimes it cannot be avoided.
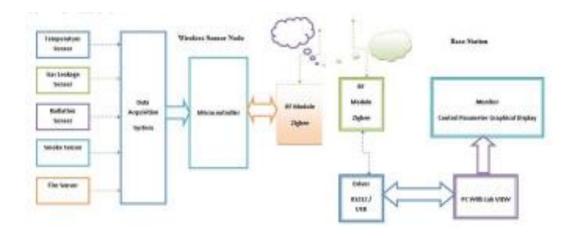
[2] A Hazardous Area Personal Monitoring System for Operators in Gas Depots and Storage Tanks.

The worker safety in industrial hazardous environments is nowadays a critical issue especially in Oil&Gas, gas storage and distributions or chemical plants, where an explosive atmosphere may be present. It consist of state of the art, sensor node structure, main board, sensors hat, power consumption optimization strategy, sensors test, CO e O_2 sensors test, catalytic sensor test, network architecture.

This work shows the design of a new wearable device for the detection of some toxic and explosive gases. From the tests it was shown that even using a cheap and low power electronic system and standard commercial sensors it is possible to obtain sufficient measurement accuracy to implement safety monitoring for hazardous areas. Compared with the most diffused commercial devices, the developed sensor node can operate for one working week without recharging its battery. The system can host different sensor types allowing to read almost all available commercial sensors for portable devices.

SYSTEM ARCHITECTURE

Based on requirements above, system architecture of the wireless sensor network for hazardous environmental monitoring is designed as Figure 1. The sensor network consists of a set of sensor nodes across the hazardous area, as ink node and a base station. Sensor nodes are designed to sense gas leaks, radiation, critical temperature, fire and smoke across the hazards field in this application. All infield sensory data are wirelessly transmitted into a sink node, which then sends them to the base station for data storing and analyzing using Zigbee protocol communication.

REFERENCES

[1] Qingyuan Zhu, Chenglu Wen,Wenyi Xie "General Environment Integrated Monitoring and Data Management System

Based on Virtual Instrument ", Advances in Information Technology and Industry Applications , 2012 ,Volume 136, pp 163-168 .

[2] K.P.Vinay , P.Naresh , J.V.S.S Manoj , M. Pranay Kumar "Virtual Instrumentation Based Surveillance System in Industry" , International Journal of Engineering Research and Applications (IJERA) , Jul-Aug 2013 , Vol. 3, Issue 4, pp.903-907.

[3] Gang Zhao "Wireless Sensor Networks for Industrial Process Monitoring and Control: A Survey", Network Protocols and Algorithms, 2011, Vol. 3, No.1, pp.46-63.

[4] Kumarsagar. M. Dange , Prof. R. T. Patil "Design of Monitoring System for Coal Mine Safety Based on MSP430" , International Journal of Engineering Science Invention, July. 2013, Volume 2 Issue 7, PP.14-19.

[5] L K Bandyopadhyay , S K Chaulya , P K Mishra , A Choure , B M Baveja " Wireless information and safety system for mines " , journal of scientific and industrial Research 2009 , Vol.68 February , pp.107-117

[6] G.Ahalya P.Suresh Babu, P.Prabhakar Rao "Development Of Coal Mine Safety System Using Wireless Sensor Networks" , International Journal of Engineering Science & Advanced Technology ,2013, Volume-3, Issue-3, 74-78

[7] Achonu O. Adejo , adeiza J , Onumanyi, Jane M. Anyanya , Stephen O. Oyewobi "Oil and gas process monitoring through wireless sensor networks: a survey" , Ozean Journal of Applied Sciences, 2013 ,issue 6(2), 2013 ,pp.39-43

[8] P.V. Mane-Deshmukh, B.P. Ladgaonkar*, S. C. Pathan, S. S. Shaikh "Microcontroller Pic 18f4550 Based Wireless Sensor Node to Monitor Industrial Environmental Parameters" , International Journal of Advanced Research in Computer Science and Software Engineering , October 2013 ,Volume 3, Issue 10, ,pp.943-950 .

[9] S. Gajalakshmi, P. Preethi, T. Saranya, Jebasingh Kirubakaran. S. J "Implementation of WSNs in Patient Monitoring With Sensor Node Failure Detection" , International Journal of Emerging Technology and Advanced Engineering , Mar 2014 ,Volume 4, Issue 3, pp.536- 540 .