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Industrial Pollution Monitoring System Using LabVIEW

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ABSTRACT

The main objective of Industrial pollution monitoring system using LabVIEW and ZIGBEE is to determine the quality of effluent management and working environment of industries, to know the key descriptors to be considered in pollution monitoring system and send the information to Pollution Control Board (PCB) and public. The majority applications of pollution monitoring systems are in industries. The control of the parameters which causes pollution and deteriorates the industrial and natural environment pattern is a great challenge and has received interest from industries especially in Petro chemical industries, Paper making industries, Water treatment industries and Sugar manufacturing industries.

KeywordS: Arduino Uno, Atmega 328P, CO Sensor, Temperature Sensor, LabVIEWAT89X52, LCD, Zigbee Module

I. INTRODUCTION

The process of industrial quality assessment is an evaluation of the industrial quality in relation to standard quality set by pollution control board. Particular attention is given to factors which may affect human health and the health of the natural system itself. Environmental quality assessment includes the use of monitoring to define the condition of the water, to provide the basis for detecting trends and to provide the information enabling the establishment of cause effective relationships. The main reason for the assessment of the quality of the industrial environment has been, traditionally, the need to verify whether the observed industrial quality is suitable for intended uses. The use of monitoring has also evolved to determine trends in the quality of the water, air and soil environment.

II. METHODS AND MATERIAL

A. Proposed System

The proposed system will receive the measured data from sensor and provide the useful information for users by understanding the extent of air pollution for that industry. This information includes the measurement of toxic or harmful gases present in the air which can lead to adverse effects on human health as well as agricultural field. The function of smoke sensor is to capture the current real time status of pollution in air. The proposed system pollution control monitoring system provides information about the various parameters in surrounding environment of an industry through wireless. The information about the environment condition continuously monitored at the pollution control board using LabVIEW. The same information is displayed in the public zone areas. The proposed monitoring system structure is based on the framework for the purpose of context awareness. For controlling and monitoring the sensor values and air pollution, it will use two different systems i.e. air pollution monitoring system and sensor control system. This air pollution monitoring system will support the sensor data abstraction and air pollution prevention models for studying the pollution level and the control system will support the operators which will control sensor such as status check.

B. Existing System

In the recent decade, various technology trends have emerged in the field of geosciences in effective ways. One of them is the readily available technology of wireless communication networks and advancements in

the development of low-power, short-range radio-based communication networks, and the development of new micro-sensors and sensor materials.

C. Design Analysis

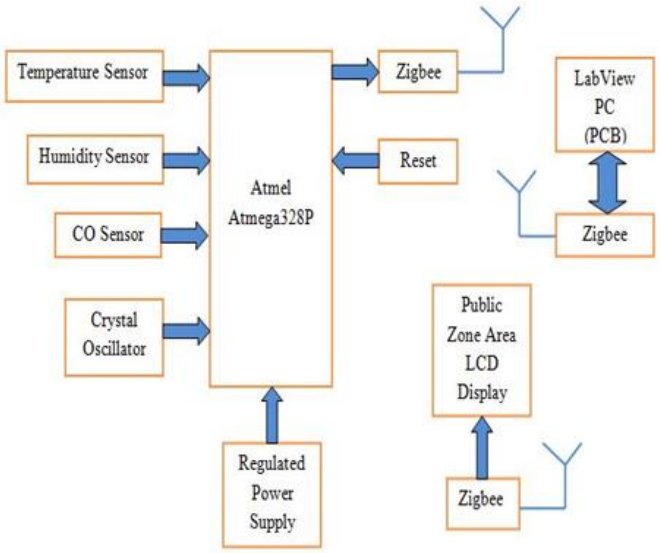

Figure 1. Block Diagram of Transmitter Section of Industrial Pollution Motoring System

The industrial pollution monitoring system provides information about the various parameters of the surrounding environment of the industries. The transmission section continuously transmits the information about the various parameters of the pollution with a delay of 100 clock cycles. The various sensors such as Humidity, Temperature, CO are interfaced to the Atmega 328p processor to the analog input pins of the processor. Initially these pins are set to high where the information provided by the sensors is read through this pins. And processed, the information provided by the sensors is in analog in nature. This information is converted to digital by the internally provided six input 10bit ADC.

This is an advantage of the Atmega 328p processor which enables the user to interface analog sensors and process the data. The processed data is transmitted wirelessly using Zigbee module to the Pollution Control Board (PCB). At the PCB the information is monitored in the LabVIEW. LabVIEW is a software tool which enables the user to design various applications graphically and used for testing. From here the PCB sends the same information to the PUBLIC ZONE AREAS and displayed in the LCD. By a write command as 'A' in the transmit module in the LabVIEW. Zigbee module is interfaced to the LabVIEW through RS-232 to USB cable. The PCB section forms the transceiver as it receives the information from the Arduino Uno board and transmits the information to the public zone areas.

The 8051 microcontroller at the receiver side receives the serial data from the PCB serial through the ports pin no 3.1(TXD) and pin no 3.2(RXD). An LCD display is interfaced to the 8051 controller and the information is displayed depending upon the write command in the LabVIEW software by the user. The information is updated each and every time depending upon the write command by the user. Till that time there is no information is displayed in the LCD. This is the overall working of this project which is efficiently used to detect the values and to display it.

Temperature Sensor: LM35

LM35 converts temperature value into electrical signals. LM35 series sensors are precision integrated-circuit temperature sensors whose output voltage is linearly proportional to the Celsius temperature. The LM35 requires no external calibration since it is internally calibrated. . The LM35 does not require any external calibration or trimming to provide typical accuracies of ±1⁄4°C at room temperature and ±3⁄4°C over a full −55 to +150°C temperature range.

The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies. As it draws only 60 μA from its supply, it has very low self-heating, less than 0.1°C in still air.

Humidity Sensor: HS 1101

Based on a unique capacitive cell, these relative humidity sensors are designed for high volume, cost sensitive applications such as office automation, automotive cabin air control, home appliances, and industrial process control systems.

CO Sensor: MQ-2

Sensitive material of MQ-2 gas sensor is SnO2, which with lower conductivity in clean air. When the target combustible gas exist, the sensor's conductivity is more

higher along with the gas concentration rising. Please use simple electro circuit, Convert change of conductivity to correspond output signal of gas concentration. MQ-2 gas sensor has high sensitity to LPG, Propane and Hydrogen, also could be used to methane and other combustible steam, it is with low cost and suitable for different application.

D. Flow Chart

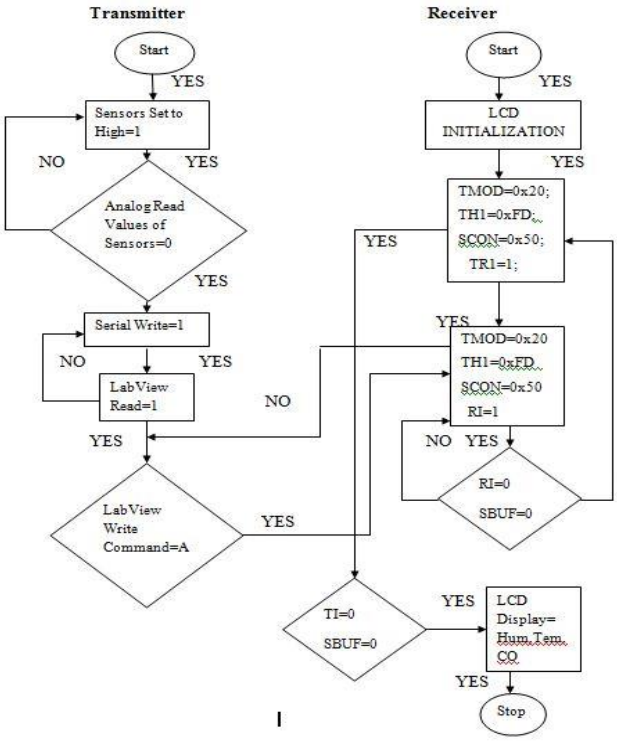

Figure 2. Flow chart of proposed system

III. RESULTS AND DISCUSSION

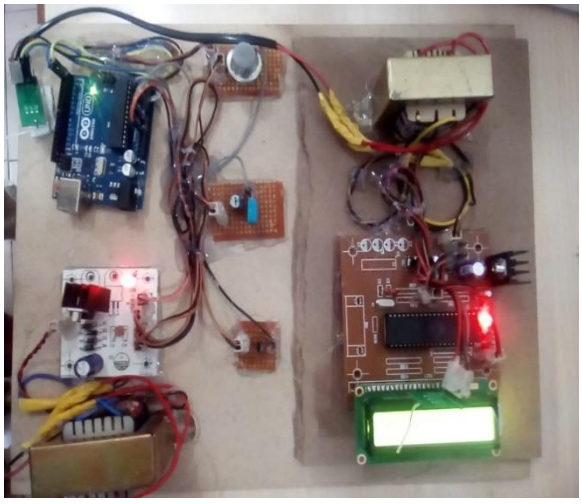

Figure 3. Designed Hardware

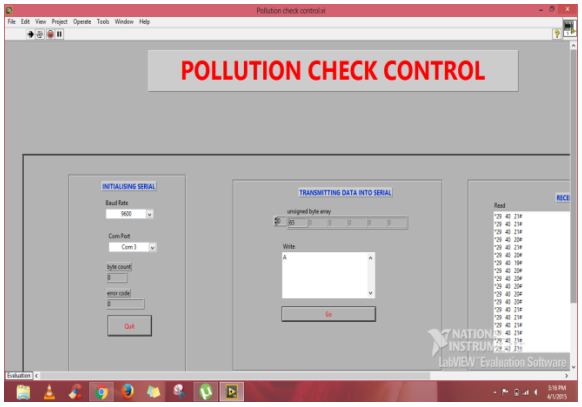

Figure 4. LabVIEW output

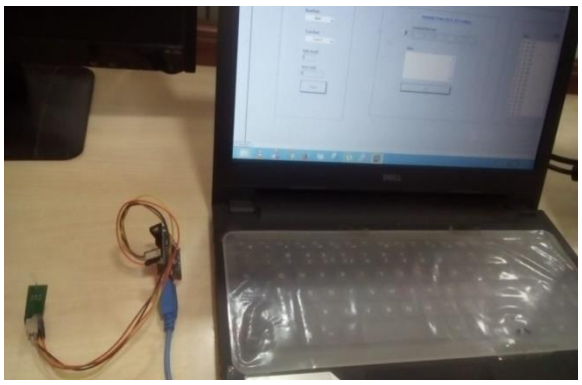

Figure 5. RS-232 TO PC Interfacing of Zigbee Module

IV. CONCLUSION

The field of pollution monitoring system is very wide and this project is an attempt to minimize the problem of cost and regular inspections by the pollution control board. The Pollution Control Board can take necessary actions against the industries depending upon the amount of release of effluents. To make inspections by Pollution control board involve huge cost.

A mechanism using Zigbee and LabVIEW is introduced in this proposed methodology, which will automatically monitor when there is a disturbance affecting the system. The system is implemented using LabVIEW software.

V. FUTURE SCOPE

The performance and robustness pollution monitoring system can be further improved by implementing sensors for controlling dust, smoke moisture and other parameters their by improving the industrial and natural environment.

By using Internet of Things the information about the pollution parameters can be sent to the remote stations. Due to this the people can get awareness about the environment conditions. And can take necessary precautions to withstand for that environment conditions.

VI. REFERENCES

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