Intellectual climate system for monitoring Industrial environment

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***Abstract*— the monitoring of the temperature and humidity in indoor locations in the industry are very important. Temperature and humidity sensor is the main components of the Intellectual climate control which is more useful. In the manufacturing industry some parameter like temperature, humidity are very important parameter which is directly or indirectly affect on production of the product. Here we need to monitor the temperature as well as humidity to protect the product and company from any type of accident. Such type of system are implementing by embedded systems. The main aim is to obtain desired temperatures in various rooms. The paper describes a system for monitoring the temperature as well as humidity in indoor locations. The communication between them is done wirelessly through a RF frequency. In the industry the temperature and humidity should be in specific range.**

Keywords--- WSN, Temperature sensor, Humidity sensor, Transmitter, Receiver etc.

I. INTRODUCTION

Now a day's so many applications are implemented using embedded system to monitor the temperature and humidity. In the industry like semiconductor, chemical or any manufacturing industry there are some equipment which is always produce heat. And due to producing heat the temperature and humidity will change in the environment. If the temperature is out of range it might be possible to occurs catastrophe. It may be human losses or it may be industrial assets losses. It also impact on the conductivity of the product. In this paper, monitor the humidity and temperature from different locations in the industry. Here wireless sensor network used for collecting the information from different locations in the industry. According to environment temperature and humidity is continuously changed. So, the temperature must be monitored and controlled not only for human health but also for avoiding accidents and in industrial processes. Overheating can lead to explosions causing important damages or, worse, human deaths. Temperature is crucial in many industrial domains, such as chemistry, electronics, manufacturing of integrated circuits etc.

The intellectual climate systems are developed using IT infrastructure. Embedded systems are used in various applications for implementing monitoring and controlling nodes. The node consists of temperature sensor and humidity sensor. Here LM35 is used for sensing the temperature. RF Transmitter and RF Receiver for transmitting and receiving the sensor data.

A. Related works

The solution from reference [1] focuses on distributed climate system one of the most important parameters which have to be monitored and controlled is the temperature. This paper presents a solution a distributed intelligent climate system for indoor locations. Embedded systems connected to a local network sense the temperature and send the data to a server. Through the server side application the temperature limits are established and the temperature is monitored and controlled in all the locations. Intelligent climate systems have the role to offer appropriate climate conditions in a certain environment

The output from reference [2] concentrates on refrigeration systems. The monitoring and regulating of the temperature in indoor locations are components of the intelligent climate control which is useful in more and more buildings. Embedded systems are used for implementing such systems. The main target is to obtain desired temperatures in different rooms, optimizing the whole energy consume. The paper describes a system for monitoring and regulating the temperature in indoor locations. The heating infrastructure is supposed to be made of a central heating station, for all the rooms, and one radiator in each room having electro valves mounted on them. The system consists in a mobile command unit, a central command unit and local monitoring and regulating units. The communication between them is done wirelessly through a RF frequency.

Reference [3] describes WSN based home monitoring system for elderly activity behavior involves functional assessment of daily activities. In this paper, we reported a mechanism for estimation of elderly well-being condition based on usage of house-hold appliances connected through various sensing units. We defined two new wellness functions to determine the status of the elderly on performing essential daily activities. The developed system for monitoring and evaluation of essential daily activities was tested at the homes of four different elderly persons

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living alone and the results are encouraging in determining wellness of the elderly.

The result from Reference[4] describes that the paper propose an intelligent energy controller algorithm that efficiently manages energy consumption for both heating and cooling spaces. Our approach is based on considering the home's occupancy and sleep patterns as well as outdoor temperature and user's preferences as inputs. The proposed approach has been evaluated by considering the well-known energy home simulation software HOT2000. Therefore our model follows the same house specifications that include the home's dimensions and energy performance characteristics among others. We have calculated how much energy a home modeled will use under emulated conditions. Our findings show that considering human's occupancy patterns could reduce the overall energy consumption up to 50% in an ideal case.

Reference [5] describes a portable wireless data logging system for temperature monitoring in real time process dynamics. Process variables (like temperature, pressure, flow, level) vary with time in certain applications and these variations should be recorded so that a control action can take place at a defined set point. This paper proposes a 8-bit embedded platform for a temperature sensor node having a network interface using the 802.15.4 ZigBee protocol, that is a wireless technology developed as open global standard to address the low-cost, low-power wireless sensor networks. The wireless temperature sensor node senses and transmits the variations in the local temperature to the central computing unit placed within the range. The central base station receives the data and stores it in the file and plotting the variations simultaneously.

II. NODES USED FOR THE APPLICATION:

Wireless Sensor Network is an emerging technology in which a large number of sensor nodes organize and operate autonomously. These nodes are usually small in size with limited processing power, limited memory and limited energy source. Each sensor node comprises of sensing unit, microcontroller, ADC, memory, transceiver and power unit. Data collected at the wireless sensor node is transmitted to the gateway or base station (BS) for further processing.

In this paper, two nodes are created using temperature sensor and humidity sensor and this node is wireless. With the help of nodes temperature sensor and humidity sensor receives the environmental variation in the climate. In the industry various equipment are used. All the parameter like temperature and humidity are continuously vary in the different locations in the industry.

The temperature and humidity are sensed through the temperature sensor and humidity sensor. The signals are received through the both the sensor is analog signal. But microcontroller requires digital signal so, add analog to digital converter (ADC) for signal conversion. After receiving digital signal from ADC Signal is processed under the microcontroller and then transmits the output to the transmitter but transmitter required 9 v supply and microcontroller provide 5 v supplies. So amplifier is used to amplify the signal and generate the 9 volt supply to transmitter.

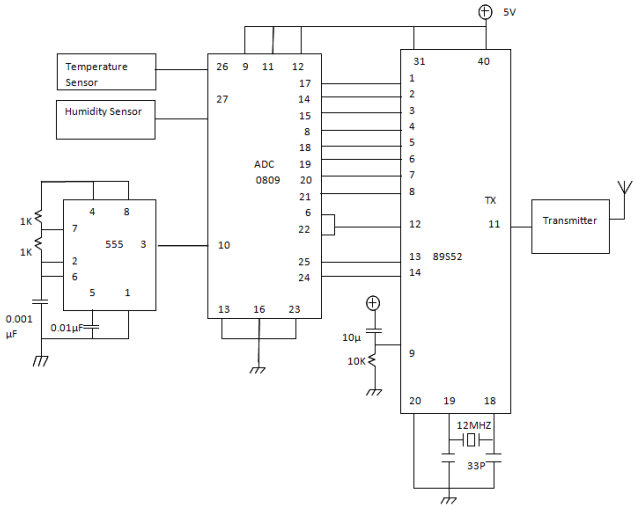

Figure A: Block diagram of wireless sensor node

Transmitter transmit the signal to Receiver and with the help of receiver data in which temperature and humidity data received through receiver and here use 89S52 microcontroller to process the data The MAX232 is an integrated circuit, that converts signals from an RS-232 serial port to signals suitable for use in TTL compatible digital logic circuits. The MAX232 is a dual driver/receiver and typically converts the RX, TX. It is helpful to understand what occurs to the voltage levels. When a MAX232 IC receives a TTL level to convert, it changes a TTL Logic 0 to between +3 and +15 V, and changes TTL Logic 1 to between -3 to -15 V, and vice versa for converting from RS232 to TTL. This can be confusing when you realize that the RS232 Data Transmission voltages at a certain logic state are opposite from the RS232 Control Line voltages at the same logic state.

Figure [F] shows output of the microcontroller is displayed on the LCD. LCD which is having 16 by 2 rows. In the first row, the result of first node parameter temperature (T1) shown on first row from the address 0x80 and on the same row humidity (H1) also shown. Then the result of second node displayed on the second row from the

address 0xc0. At start Temperature T2 is shown and humidity(H2) is shown.

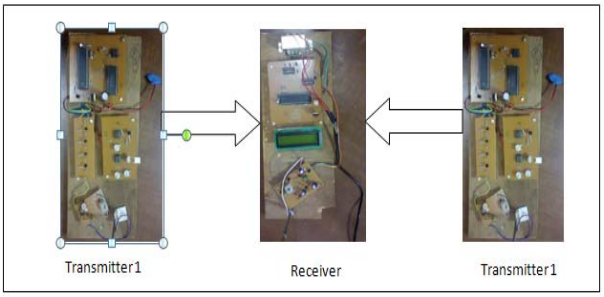

Figure B: Architecture of the application

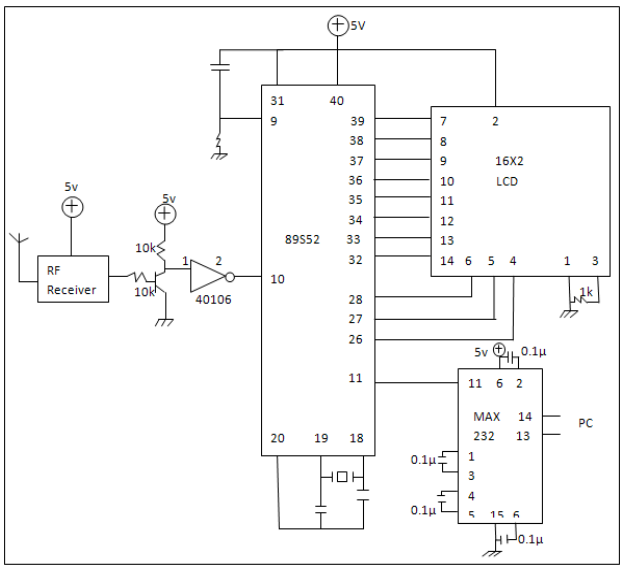

Figure C: Block diagram output circuit with receiver.

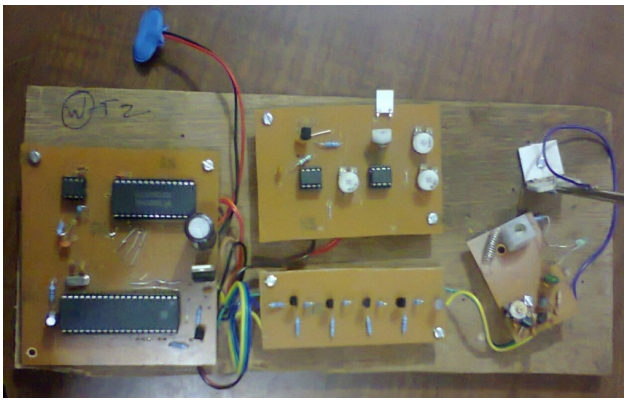

Figure D: Circuit diagram of Transmitter

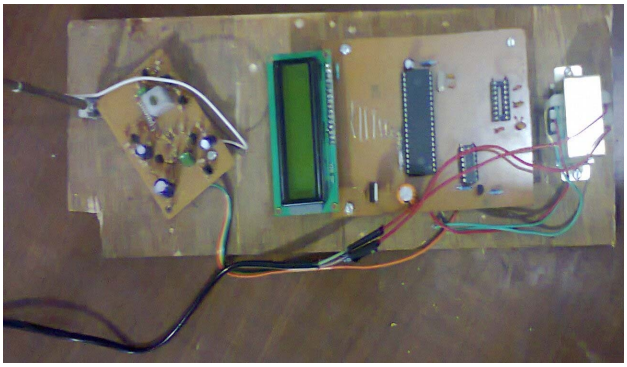

Figure E: Circuit diagram of Output device with receiver

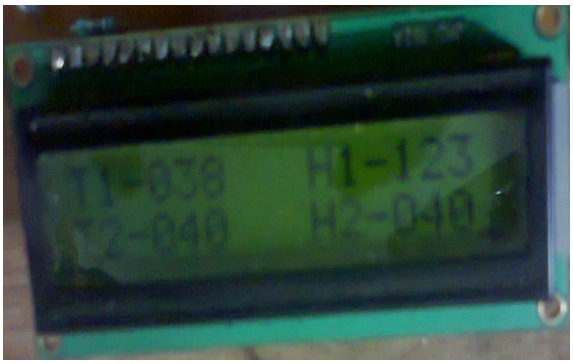

Figure F: Output of nodes on LCD

III. CONCLUSION AND FUTURE WORKS:

The WSN based temperature as well as humidity monitoring applications was discussed. Still there are some issues in continuous functioning of the network. When we use two nodes then LCD is sufficient to show the result. When we increased the nodes then we use serial port to send the data on personnel computer to show the whole data which is received from different nodes which is located at different locations in the industry. We have problem to decide what is the range of environment it should to be maintained that's why we need to apply the data mining to discovered the meaningful data.

REFERENCES

[1] M. Popa and H. Ciocarlie, "Distributed Intelligent Climate System for Indoor Locations", 2011.

[2] R Freitas, F. Soares, V. Vieira, and J. Machado,"Monitoring and control of a cooling system in a Commercial Store",in Proc. Of the world congress on engineering 2010,Vol. II, WCE 2010, London,UK,June 30 – July 02,2010.

[3] M. Popa and A.T. Gambutan, "Remote temperature monitoring and regulating system for indoor locations", 2009.

[4] Rana A baalkhail, Mauricio Orozco,et al,"Home Energy Saving for heating/cooling system by distributed intelligent

energy controller",2012.
[5] S. Veerasingam, S. Karodi, S. Shukla, and M. C. Yeleti, "Design of Wireless Sensor Network Node on ZigBee for Temperature Monitoring", *Advances in Computing, Control, and Tele - communications Technologies, 2009 Internationa conference,* December 28-29, 2009, Trivandrum, Kerala, India, ISBN 978-0-7695-3925-7, pp. 20-23.
[6] J.A. Ferre, A. Pawlowski, et al," A Wireless Sensor Network for Greenhouse Climate Monitoring", 2010.