

Development of Ambient Environmental Monitoring System through Wireless Sensor Network (WSN)

S.Rajendran¹, K.Ravindranath², M.Saravana kumar³, R.Sujith⁴ and M.Ashok kumar⁵

UG Scholar, Department of ECE, Adhiyamaan College of Engineering, Hosur, India^{1,2,3,4}

Associate Professor, Department of ECE, Adhiyamaan College of Engineering, Hosur, India⁵

ABSTRACT: In the 21st century the process of cultivation has become a tougher job than before. To overcome the difficulties face by the farmers we have come up with an idea that helps farmers to get maximum yield. This paper presents the design and the implementation of a Wireless Sensor Network that can monitor the air temperature, humidity and ambient light intensity in a crop field. This can help the end users such as farmers in the better understanding of agriculture practices to be adopted for crop management. The system consists of nodes, which are equipped with small size application specific sensors. The sensor data is transmitted via Zig-Bee transceiver to the centrally localized computer terminal for data logging and analysis. The sensor nodes can additionally be programmed from the computer terminal itself according to the changing needs of farmers, thus preventing the need for a redeployment of the Wireless Sensor Network every time some changes are to be made.

KEYWORDS: PIC16F877A, Temperature Sensor, Gas sensor, Moisture Sensor, Humidity Sensor

I. INTRODUCTION

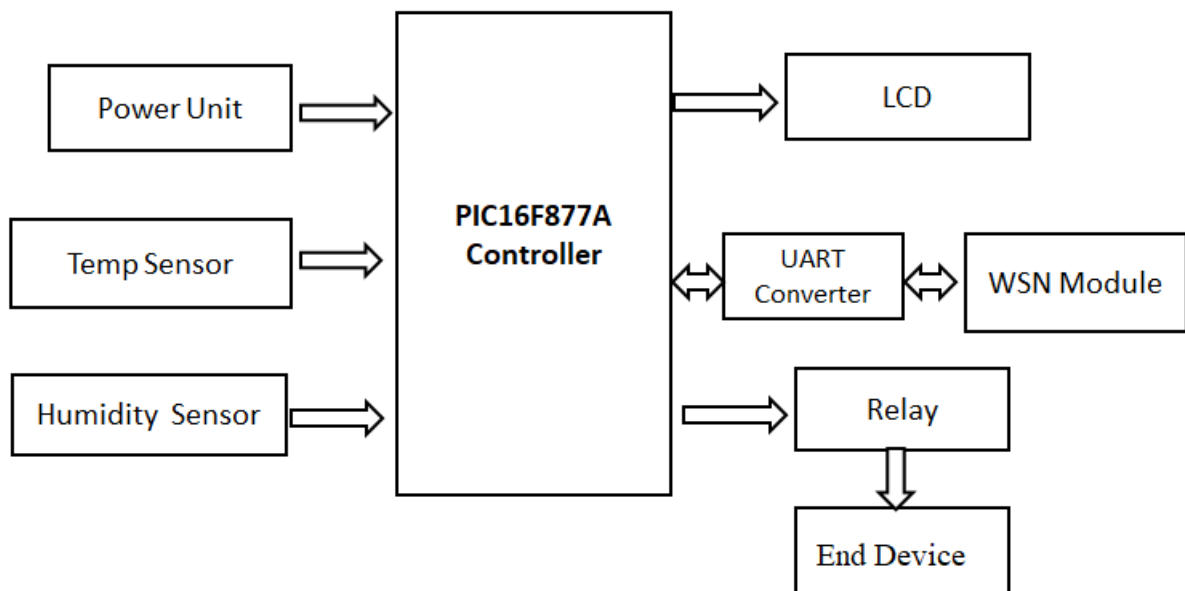
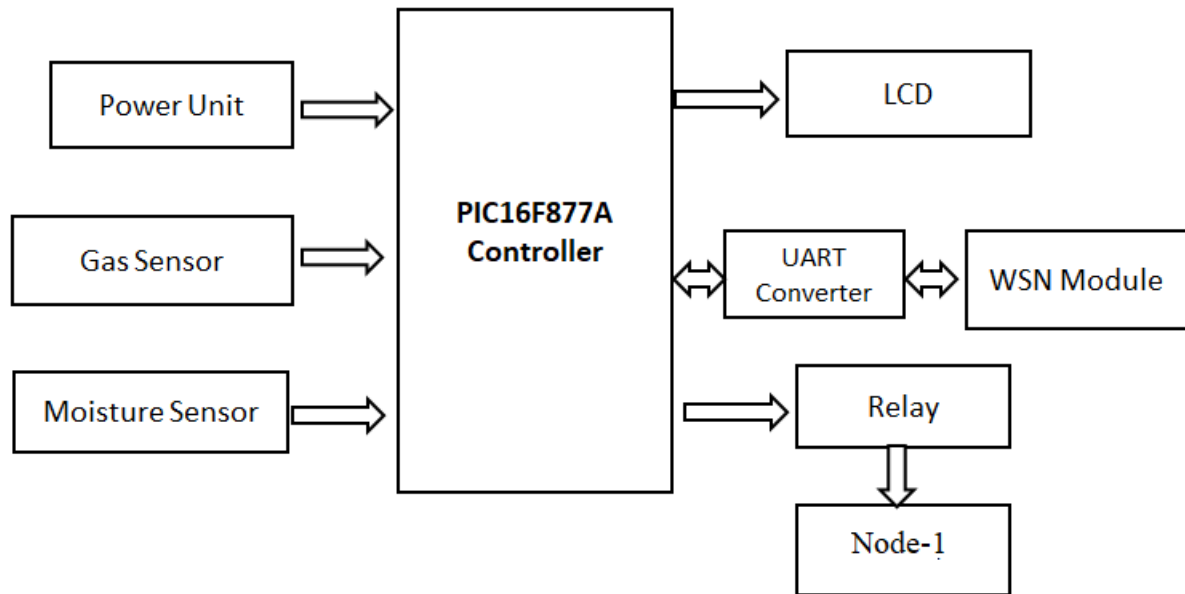
An emerging technology to be deployed at an accelerated pace. WSN combines sensing, computation and communication into a single tiny device. A typical WSN mostly consists of PIC16F877A, ZigBee transceiver, relay nodes, end devices. End devices are spatially distributed nodes which work independently and collect required data which is then sent to the receiver end.

The main objective of this work is to design a low cost WSN for agriculture application. New sensor nodes have been designed to minimize the cost of entire WSN rather than using existing wireless sensor mote available in the market at much higher cost which will hamper the main motive of the work to minimize cost with required functionality.

II. PROPOSED SYSTEM

Greenhouse crops can promote diseases caused by fungus and bacteria, affecting the growth of the crops. In this paper, we present a WSN based automatic monitoring system to prevent dew condensation and dry ground in a greenhouse or in farming land environment. The system is composed of sensor nodes for collecting data, base nodes for processing collected data, relay nodes for driving devices for adjusting the environment inside greenhouse and an environment server for data storage and processing.

BLOCK DIAGRAM



III.COMPONENTS OF PROPOSED SYSTEM

PIC16F877A

High-performance RISC CPU, Operating speed: DC - 20 MHz clock input DC - 200 ns instruction cycle, Up to 8K x 14 words of FLASH Program Memory, Up to 368 x 8 bytes of Data Memory (RAM) Up to 256 x 8 bytes of EEPROM data memory, Low-power, high-speed CMOS FLASH/EEPROM technology, In-Circuit Serial Programming (ICSP), Wide operating voltage range: 2.0V to 5.5V, Commercial and Industrial temperature ranges, Low-power consumption.

TEMPERATURE SENSOR

The LM35 is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature (in °C). You can measure temperature more accurately than a using a thermistor. The sensor circuitry is sealed and not subject to oxidation, etc. The LM35 generates a higher output voltage than thermocouples and may not require that the output voltage be amplified.

GAS SENSOR

This is a simple-to-use liquefied petroleum gas(LPG) sensor, suitable for sensing LPG (composed of mostly propane and butane) concentrations in the air. The MQ-6 can detect gas concentrations anywhere from 200 to 10000ppm.liquefied petroleum gas(LPG)

MOISTURE SENSOR

This sensor can be used to test the moisture of soil, when the soil is having water shortage, the module output is at high level, and else the output is at low level. By using this sensor one can automatically water the flower plant, or any other plants requiring automatic watering technique. Module dual output mode, digital output is simple, analog output more accurate. Soil moisture sensors measure the volumetric water content indirectly by using some other property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content

HUMIDITY SENSOR

A humidity sensor senses, measures both moisture and air temperature. The sensor is composed of two metal plates and contains a non-conductive polymer film between them. This film collects moisture from the air, which causes the voltage between the two plates to change. These voltage changes are converted into digital readings showing the level of moisture in the air.

LCD DISPLAY

We have used 16*2 LCD Display.

ZIGBEE MODULE

ZigBee Module is a wireless transceiver module where it is used to transmit and receive the signal.

MONITORING SECTION

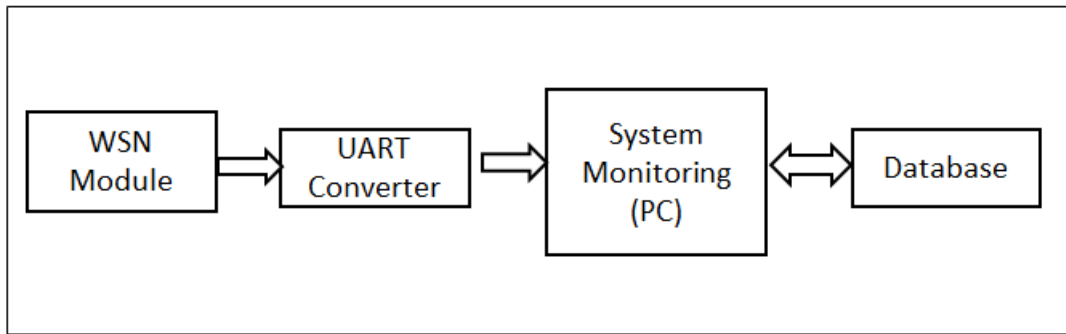


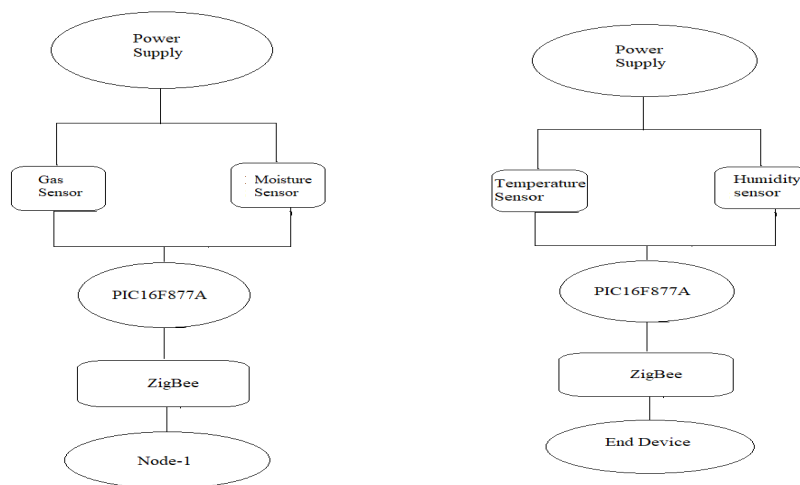
Fig 2: Block Diagram

IV. WORKING

In this project we have used two nodes in Node-2 we have connected Gas Sensor and Moisture Sensor sense the amount of Gas present in the land(i.e. Fertilizer gas content) and amount of water content in the land. The obtained values are given to the PIC16F877A Controller, from the PIC Controller these signals are sent to ZigBee and through ZigBee these signals are hopped to Node-1.

Node-1 has Temperature Sensor and Humidity Sensor. These sensors sense the temperature of the atmosphere and the moisture content in the atmosphere and the output signals are fed to the PIC16F877A Controller and finally from the PIC Controller these signals are sent to Zig-Bee through Zig-Bee these signals are hopped to end device.

FLOW CHART



ADVANTAGES

The advantages of this system are Reduce Man power, easy to access, low cost, able to monitor the whole system at host place.

V. CONCLUSION

This paper, design and implementation of a ZigBee based energy efficient environmental monitoring, alerting and controlling system for agriculture is proposed. Wireless monitoring of field not only allows the farmer to lessen the human power, but it also allows helps to track the changes accurately happening instantly at the field. The proposed system is capable of controlling the essential parameters necessary for plant growth, viz. watering using sprinkler, temperature, humidity, soil moisture and light intensity etc. Also this proposed system of farming is user-friendly and highly robust.

REFERENCES

- [1] Building a low cost solution using wireless sensor network for agriculture application anindita mondal & iti saha misra department of electronics and telecommunication engineering jadavpur university kolkata, india. sagar bose department of electronics and telecommunication engineering (vlsi design & microelectronics technology) jadavpur university kolkata, india
- [2] Lee, Jin-Shyan, Yu-Wei Su, and Chung-Chou Shen. "A comparative study of wireless protocols: Bluetooth, UWB, ZigBee, and Wi-Fi." In Industrial Electronics Society, 2007. IECON 2007. 33rd Annual Conference of the IEEE, pp. 46-51. IEEE, 2007.
- [3] Howitt, Ivan, and Jose A. Gutierrez. "IEEE 802.15. 4 low rate-wireless personal area network coexistence issues." In Wireless Communications and Networking, 2003. WCNC 2003. IEEE, vol. 3, pp. 1481-1486. IEEE, 2003
- [4] Petrova, Marina, Janne Riihijärvi, Petri Mähönen, and Saverio Labella. "Performance study of IEEE 802.15. 4 using measurements and simulations." In Wireless communications and networking conference, 2006. WCNC 2006. IEEE, vol. 1, pp. 487-492. IEEE, 2006