ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

Design and Implementation of Irrigation System Using Zigbee

S.Ruth Beulah Margarate
Student of M.Tech,
Dept of ECE,
AVR&SVR college of Engineering and Technology,
Kurnool, Andhra Pradesh.

T. Immanuel, M.Tech
Assistant Professor,
Dept of ECE,
AVR&SVR college of Engineering and Technology,
Kurnool, Andhra Pradesh.

Abstract:

Green house monitoring systems are convenient, especially for those who travel. If installed and programmed properly, green house monitoring systems can even save your money and help in water conservation. Dead lawn grass and plants need to be replaced, and that can be expensive but the savings from green house monitoring systems can go beyond that. The proposed monitoring controller node is composed of a micro-processor, transceivers, analog to digital converters. The sensing parameters can be displayed as values in PC. if there are any exceed condition of parameters (temperature, Ph, moisture) ,then alert will be made. This system makes remote monitoring possible in monitoring applications.

Key words: ARM, Wi-Fi, sensors,

I. INTRODUCTION:

There are many systems to achieve water savings in various crops, from basic ones to more technologically advanced ones. For instance, in one system plant water status was monitored and monitoring scheduled based on canopy temperature distribution of the plant, which was acquired with thermal imaging. In addition, other systems have been developed to schedule monitoring of crops and optimize water use by means of a crop water stress index. An alternative parameter to determine crop monitoring needs is estimating plant evapotranspiration (ET). ET is affected by weather parameters, including solar radiation, temperature, relative Ph, wind speed, and crop factors, such as stage of growth, variety and plant density, management elements, soil properties, pest, and disease control [8]. Systems based on ET have been developed that allow water savings of up to 42% on time-based monitoring schedule. Green house monitoring systems are convenient, especially for those who travel. If installed and programmed properly, green house monitoring systems can even save your money and help in water conservation. Dead lawn grass and plants need to be replaced, and that can be expensive but the savings from green house monitoring systems can go beyond that. Watering with a hose or with oscillator wastes water. !either method targets plant roots with any significant degree of precision.Green house monitoring systems can be programmed to discharge more precise amounts of water in a targeted area, which promotes water conservation since the deployment and use of wired systems in remote areas is usually unfeasible due to high costs, wireless is the best solution. The monitoring controller node is composed of a micro-processor, transceivers, analog to digital converters. Sensor nodes are deployed for field process monitoring and control. The sensing parameters can be displayed as values in PC with alert conditions in case of any extreme level. This system makes remote monitoring very reliable in remote cases.

Block Diagram:

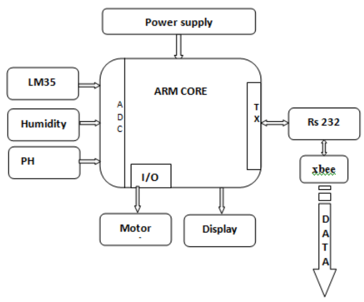

Fig1: monitoring control system

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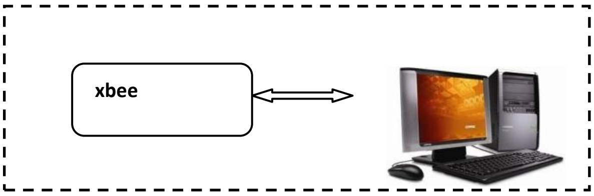

Fig2: Server unit

II. Design and Implementation:

The monitoring controller node is composed of a micro-processor, transceivers, analog to digital converters. Sensor nodes are deployed for field process monitoring and control. Temperature sensor is an electronic device which provides a voltage analogue of the temperature of the surface on which it is mounted. This voltage will be passed to the ARM processor ADC channel 0. Then the ADC converter will give a digital sensor value which will be transferred through the UART protocol and then reaches the server through zigbee communication.

In order to find the moisture level in the monitoring field we uses the Ph sensor. In this proposed work , we are using a Resistive type Ph sensor which pick up changes in the resistance value of the sensor element in response to the change in the Ph. Then a polymeric film is applied on the electrode; the film acts as a Ph sensing film due to the existence of movable ions. Change in impedance occurs due to the change in the number of movable ions.This change in movable ions causes change in the resistive metal which in turn creates voltage change in the sensor. This will be a very minute voltage change.

IN order to read the voltage change, a comparator LM358 is used in the Humidity sensor board. The comparator continuously checks the humidity sensor voltage with the reference voltage. If the sensor voltage exceeds the reference voltage then the comparator gives digital logic output (high or low). An led indication will be given in the kit for user identification. This voltage will be given to the microcontroller for further transmission and motor will be controlled based on the result.

III. System Hardware:

LPC2148 Processor:

LPC2148 Microcontroller Architecture. The ARM7TDMI-S is a general purpose 32-bit microprocessor, which offers high performance and very low power consumption. The ARM architecture is based on Reduced Instruction Set Computer (RISC) principles, and the instruction set and related decode mechanism are much simpler than those of micro programmed Complex Instruction Set Computers (CISC). This simplicity results in a high instruction throughput and impressive real-time interrupt response from a small and cost-effective processor core.

Pipeline techniques are employed so that all parts of the processing and memory systems can operate continuously. Typically, while one instruction is being executed, its successor is being decoded, and a third instruction is being fetched from memory. The ARM7TDMI-S processor also employs a unique architectural strategy known as Thumb, which makes it ideally suited to high-volume applications with memory restrictions, or applications where code density is an issue.The key idea behind Thumb is that of a super-reduced instruction set. Essentially, the ARM7TDMI-S processor has two instruction sets:

• The standard 32-bit ARM set.
• A 16-bit Thumb set.

The Thumb set's 16-bit instruction length allows it to approach twice the density of standard ARM code while retaining most of the ARM's performance advantage over a traditional 16-bit processor using 16-bit registers. This is possible because Thumb code operates on the same 32-bit register set as ARM code. Thumb code is able to provide up to 65% of the code size of ARM, and 160% of the performance of an equivalent ARM processor connected to a 16-bit memory system.

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Temperature sensor:

TheLM35 pin diagram is shown in the figure 2 .As a temperature sensor, the circuit will read the temperature of the surrounding environment and relay temperature to us back in degrees celsius. The LM35 is a low voltage IC which uses approximately +5VDC of power. This is ideal because the arduino's power pin gives out 5V of power. The IC has just 3 pins, 2 for the power supply and one for the analog output.The output pin provides an analog voltage output that is linearly proportional to the celsius (centigrade) temperature. Pin 2 gives an output of 1 millivolt per 0.1°C (10mV per degree). So to get the degree value in celsius, all that must be done is to take the voltage output and divide it by 10- this give out the value degrees in celsius.

Fig2.Temperatur e sensor LM35

Ph sensor:

Ph is the presence of water in air. The amount of water vapor in air can affect human comfort as well as many manufacturing processes in industries. The presence of water vapor also influences various physical, chemical, and biological processes. Ph measurement in industries is critical because it may affect the business cost of the product and the health and safety of the personnel. Hence, Ph sensing is very important, especially in the control systems for industrial processes and human comfort. Here we are using a resistive type of Ph sensor.

Humidity sensor:

Humidity is the presence of water in air. The amount of water vapor in air can affect human comfort as well as many manufacturing processes in industries. The presence of water vapor also influences various physical, chemical, and biological processes. Humidity measurement in industries is critical because it may affect the business cost of the product and the health and safety of the personnel. Hence, humidity sensing is very important, especially in the control systems for industrial processes and human comfort. Here we are using a resistive type of humidity sensor.

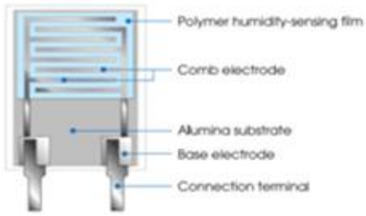

Fig3:Humidity sensor

DC motor:

DC motors are configured in many types and sizes, including brush less, servo, and gear motor types. A motor consists of a rotor and a permanent magnetic field stator. The magnetic field is maintained using either permanent magnets or electromagnetic windings..Motors are the devices that provide the actual speed and torque in a drive system. This family includes AC motor types (single and multiphase motors, universal, servo motors, induction, synchronous, and gear motor) and DC motors (brush less, servo motor, and gear motor) as well as linear, stepper and air motors, and motor contactors and starters.

Lcd display

Liquid crystal displays (LCDs) have materials which combine the properties of both liquids and crystals. Rather than having a melting point, they have a temperature range within which the molecules are almost as mobile as they would be in a liquid, but are

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grouped together in an ordered form similar to a crystal.

IEEE 802.15.4 Protocol:

The XBee/XBee-PRO RF Modules are designed to operate within the ZigBee protocol and support the unique needs of low-cost, low-power wireless sensor networks. The modules require minimal power and provide reliable delivery of data between remote devices. The modules operate within the ISM 2.4 GHz frequency band and are compatible with the following.

- Advanced Networking & Security
  - Point-to-point topology
  - point-to-multipoint topology
  - Self-routing, self-healing and fault-tolerant
  - mesh networking
- Low Power
  - TX Current: 295 mA
  - RX Current: 45 mA
  - Power-down Current: < 1 µA

IV. Conclusion

The monitoring controller node is composed of a micro-processor, transceivers, analog to digital converters. Sensor nodes are deployed for field process monitoring and control. The proposed system makes remote monitoring possible in monitoring applications.

V. References:

[1] M. C. Rodriguez Sanchez, S. Borromeo, and J. A. Hernández-Tamames, "Wireless sensor networks for conservation and monitoring cultural assets," IEEE Sensors J., vol. 11, no. 6, pp. 1382–1389, Jun. 2011.

[2] G. López, V. Custodio, and J. I. Moreno, "LOBIN: E-textile and wireless-sensor-network-based platform for healthcare monitoring in future hospital environments," IEEE Trans. Inf. Technol. Biomed., vol. 14, no. 6, pp. 1446–1458, Nov. 2010.

[3] P. Mariño, F. P. Fontan, M. A. Dominguez, and S. Otero, "An experimental ad-hoc WSN for the instrumentation of biological models," IEEE Trans. Instrum. Meas., vol. 59, no. 11, pp. 2936–2948, Nov. 2010.

[4] M. Johnson, M. Healy, P. van de Ven, M. J. Hayes, J. Nelson, T. Newe, and E. Lewis, "A comparative review of wireless sensor network mote technologies," in Proc. IEEE Sensors, Oct. 2009, pp. 1439–1442.

[5] J. Lin, W. Xiao, F. L. Lewis, and L. Xie, "Energy-efficient distributed adaptive multisensor scheduling for target tracking in wireless sensor networks," IEEE Trans. Instrum. Meas., vol. 58, no. 6, pp. 1886–1896, Jun. 2009.

[6] Wireless Medium Access Control (MAC) and Physical Layer (PHY) Specifications for Low-Rate Wireless Personal Area Networks (LR-WPANs), IEEE Standard 802.15.4, 2003.