

REVIEW ON CROP MONITORING SYSTEM USING GSM TECHNOLOGY

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Abstract - This paper presents the state of art wireless sensor technology in agriculture, which can show the path to the rural farming community to replace some of the traditional techniques. In this paper show, the sensor motes have several external sensors namely leaf wetness, soil moisture, soil pH, attached to it. Based on the value of soil moisture sensor the mote triggers the water sprinkler during the period of water scarcity. Once the field is sprinkled with adequate water, the water sprinkler is switched off. Hereby water can be conserved. It then sends SMS to the predefined numbers of the respective authority through GSM modem attached with the control station engine. Also the value of soil pH sensor is sent to the base station and in turn base station intimates the farmer about the soil pH via SMS using GSM modem.

Key Words: Wireless Sensor Network, GSM MODEM, SMS

1. INTRODUCTION

India being an agricultural country needs some innovation in the field of agriculture. Facilities agriculture technology has gotten a rapid development in Indian villages in recent years. The microclimate constructed can meet different growing demands of various crops which has improved farmers' income effectively. Wireless sensor networks (WSN) technologies have become a backbone for modern precision agriculture monitoring. WSN in agriculture helps in distributed data collection, monitoring in harsh environments, precise irrigation and fertilizer supply to produce profuse crop production while diminishing cost and assisting farmers in real time data gathering. This paper presents the preliminary design on the development of WSN for crop monitoring application. The proposed WSN system will be able to communicate each other with lower power consumption in order to deliver their real data collected to the farmer's mobile via GSM technology and to actuate the water sprinklers during the period of water scarcity.

In recent year improvement in sensors manufacturing technologies had occurred driven by post process, high speed, low power and cost microelectronic hybrid circuit's modern signal conditioning methods and advance in miniaturization technologies the requirement for commercial competitiveness is sequential enhancement of

quantity and product reliability. Furthermore, it is important to know the degree of efficiency of each sensor related to its calibration circumstances and sensing mechanism. Today simulation techniques and design aides are adequately use to predict and improve output data prior to implementation of mass production processes to save time and enhance quality. The input section is having sensor, switches. Switch is connected to the reset pin of microcontroller to reset the circuit. Sensors are leaf wetness, soil moisture, soil pH sensor etc. in this, sensor are used as input section. The output section is having sensors, switch is connected to the reset pin of microcontroller to reset the circuit sensor the sensor motes have several external sensors namely leaf wetness, soil moisture, soil pH, atmospheric pressure sensors etc .in this, sensors are used input section. The output section is having LCD, buzzer and GSM, LCD is used to display the value of various sensors a simple buzzer is an audio signaling device used to alert the people in the vicinity. It produced sound when the value is equal or greater than particular threshold value.GSM is used to send the appropriate alert message to the persons responsible for the safety of the premises.

2. SYSTEM ARCHITECTURE

Wherever Times is specified, Times Roman or Times New Roman may The system can be divided into four parts. The first part consists of sensors, second part is embedded web server, third part is client and fourth part is controlling device. The sensors are used for the monitoring purpose. In this system the sensors used are temperature, Soil moisture and humidity sensor .The data from the sensor are in the form of electrical signals which are converted into digital form by inbuilt ADC of processor and then stored into the embedded web server. Embedded web server is made up of LPC2148 ARM processor and Ethernet controller IC.ENC28J60 which stores the sensor data. ARM Processor have inbuilt SPI module which supports Ethernet communication facility. ENC28J60 IC is connected to the processor via SPI interface and handles all the network protocol requirements. When the client enters the IP address on the web browser, he will be provided with web page from where he will be able to access the sensor data. Depending on the sensor data the end device can be turned ON or OFF via relay for controlling the parameters. The controlling devices like heater or cooler for temperature control and Sprinkler for moisture control can be used.

3. HARDWARE DESCRIPTION

i) LPC2148

The LPC2148 micro-controllers are based on a 32/16 bit ARM7TDMI-S CPU core. They have real-time emulation and embedded trace support, that combines the micro-controller with embedded high speed flash memory of 512 kb of which 500 kb is used for data and 12 kb is used for software programs. It has 128-bit wide memory interface and a unique accelerator architecture that enables 32-bit Code execution at the maximum clock rate. For critical code size applications, the alternative 16-bit Thumb mode reduces the code by more than 30% with minimal performance penalty. Due to its tiny size and low power consumption, LPC2148 are ideal for various applications. It has serial communications interfaces ranging from a USB 2.0 Full Speed device, multiple UARTS, SPI, and SSP to I2Cs. It has on-chip SRAM of 8 kb up to 40 kb out of which 32 kb is used for data and 8 kb is used for DMA when USB is used. This makes these devices very well suited for communication gateways and protocol converters, soft modems, voice recognition and low end imaging, providing both large buffer size and high processing power. Two 32-bit timers/external event counter, watchdog timer, dual 10-bit ADC(s) which provides a total of 6/14 analog inputs, single 10-bit DAC which provides variable output, PWM channels and 45 fast GPIO lines with up to nine edge or level sensitive. External, two buses Advanced high performance bus (AHB) and VLSI peripheral bus (VPB).

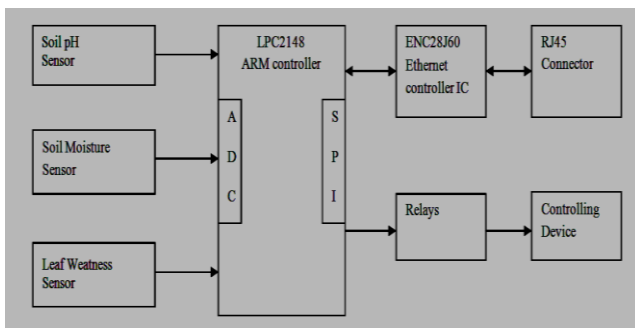


Fig.1: Block Diagram of System

ii) ENC28J60

The ENC28J60 is a stand-alone Ethernet controller with a standard Serial Peripheral Interface (SPI). It is designed to serve as an Ethernet network interface for any controller having inbuilt SPI facility. The ENC28J60 meets all of the IEEE 802.3 specifications. Inbuilt it has a number of packet filtering schemes to limit incoming packets. It also has an internal DMA module for fast data processing and hardware assisted checksum calculation, which is used in various network protocols. This controller Communicates with the host controller via an interrupt pin and the SPI, with clock rates of up to 20 MHz's. There are two dedicated pins that

are used to indicate LED link and network activity. The ENC28J60 consists of seven major functional blocks:

- a) SPI interface- It serves as a communication channel between the host controller and the ENC28J60.
- b) Control registers- They are used to control and monitor the ENC28J60.
- c) Dual port RAM buffer-Used for received and transmitted data packets.
- d) Arbiter-To control the access to the RAM buffer when requests are made from DMA, transmit and receive blocks.
- e) Bus interface-It interprets data and commands received via the SPI interface.
- f) MAC (Medium Access Control) module- It implements IEEE 802.3 compliant MAC logic.
- g) PHY (Physical Layer) module-It encodes and decodes the analog data that is present on the twisted-pair interface.

iii) SENSORS

Soil pH sensor can measured in the field using a test kit or by sending a sample to a laboratory for more accurate results. The standard depth of sampling is 10 cm. Soil pH in the field can be measured using a simple test kit based on a colour-card method available from agricultural supply stores called the Raupach soil pH kit. The kit gives the soil pH on the water scale and should be used only as a guide to soil pH. Also analysis in a laboratory provides the most accurate measurement of soil pH. It is the best basis we can have when deciding whether or not to start an acid soil management strategy such as liming. The Soil Moisture Sensor can be measure the volumetric water content of soil. Use the Soil Moisture Sensor to:

- i) Measure the loss of moisture over time due to evaporation and plant uptake.
- ii) Evaluate optimum soil moisture contents for various species of plants.
- iii) Monitor soil moisture content to control irrigation in greenhouses.

The new Dielectric Leaf Wetness Sensor enables accurate and affordable leaf wetness monitoring. Many fungal and bacterial diseases affect plants only when moisture is present on the leaf surface. The Leaf Wetness Sensor determines the presence and duration of wetness on a leaf's surface, enabling researchers and producers to forecast disease and protect plant canopies.

4. SOFTWARE DESCRIPTION

i) KEIL ARM

This is a window-based software development platform that combines a robust and modern editor with a project manager and make facility tool. It integrates all the tools needed to develop embedded applications including a C/C++ compiler, macro assembler, linker/locator, and a HEX file generator. The μ Vision IDE and Debugger is the central part of the Keil development tool chain and has numerous features that help the programmer to develop embedded applications quickly and successfully. The Keil tools are easy to use, and are guaranteed to help you achieve your design goals in a timely manner.

ii) FLASH MAGIC

Flash Magic is loaded being performed. This means that other applications that need to use the COM Port, such as debugging tools, may be used while Flash Magic is Windows software from the Embedded Systems Academy that allows easy access to all the ISP features provided by the devices. Flash Magic provides a clear and simple user Under Windows; only one application may have access the COM Port at any one time, preventing other applications from using the COM Port. Flash Magic only obtains access to the selected COM Port when ISP operations are being performed. This means that other applications that need to use the COM Port, such as debugging tools, may be used while Flash magic is loaded. To download the hex file into microcontroller board we use a programmer called flash magic tool.

5. COMMUNICATION PROTOCOLS

i) TCP/IP PROTOCOL

TCP/IP protocol provides set of rules for end-to-end connectivity which specifying how the data should be packetized, addressed, transmitted, routed and received at the destination. This is done into four abstraction layers which are used to sort all related protocols according to the scope of networking involved. From lowest to highest, the layers are as follows-

- a) Link layer- contains communication methods for data that remains within a single network segment i.e. link.
- b) Internet layer- connects the independent networks and establishes the internetwork.
- c) Transport layer- handles host-to-host communication.
- d) Application layer- it provides process-to-process data exchange for applications.

iii) HTTP Protocol

HTTP stands for Hypertext Transfer Protocol and it is the set of rules for transferring the files like text, graphic images, sound, video, and other multimedia files on the World Wide Web. When a web user opens their Web browser, the user is indirectly making use of HTTP. HTTP is nothing but an application protocol that runs on top of the TCP/IP suite of protocols. HTTP follows the idea that the files to be transferred contain the references of other files whose selection will elicit additional transfer request

6.CONCLUSION

This paper presents a system design which can realize real-time environment information inquiry, monitoring and warning based on GSM short message service. When environment parameters exceed thresholds, the monitoring equipment will send a warning message to the binding mobile phone. Testing results show the monitoring system can work with a stable performance and low cost. This offered a feasible method to build an exact monitoring and warning system in small-scale agricultural environment.

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REFERENCES

- [1] Zhuanwei Wang Chunjiang Zhao Haihui Zhang, Hongpan Fan "Real-time Remote Monitoring and Warning System in General Agriculture Environment" 978-0-7695-4522-6/11 © 2011 IEEE
- [2] A. Wheeler, "Commercial Applications of Wireless Sensor Networks using ZigBee", IEEE Communications Magazine, April 2007
- [3] MuhamadAzmanMiskam, Azwan bin Nasirudin, Inzarulfaisham Abd. Rahim, "Preliminary Design on the Development of Wireless Sensor Network for Paddy Rice Cropping Monitoring Application in Malaysia", European Journal of Scientific Research ISSN 1450-216X VoU7 No. 4 (2009), pp.649-657
- [4] S. Vijayakumar and J. Nelson Rosario, "Preliminary Design For Crop Monitoring Involving Water And Fertilizer Conservation Using Wireless Sensor Networks", IEEE 978-1-61284-486-2, (2011), pp.662-666
- [5] Ashwini .S. Malewar¹, Prof. Shaila Kharde², Prof. Sonali Chincholikar³ "Monitoring and Controlling of Environmental Parameters Using Embedded Web Server" IJARCCCE Vol. 5, Issue 2, February 2016