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# Implementation of ZigBee Based Weather Sensor Monitoring for Agriculture

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## ABSTRACT

To analyze large amount of agriculture data computing environment to provide optimal solutions for effective farming. A decision tree is a diagram that a decision maker can create to help select the best of several alternative courses of action. The primary advantage of a decision tree is that it assigns exact values to the outcomes of different actions, thus minimizing the ambiguity of complicated decisions. Because they map out an applied, real-world logical process, decision trees are particularly important to build "smart" computer applications like expert systems. They are also used to help illustrate and assign monetary values to alternative courses of action that management may take. In this research, the use of a decision tree will process input parameter to alarm when an inputted parameter matches predefined conditions.

**Keywords**: Decision Tree, Smart Computer, Sigsbee.

## I. INTRODUCTION

A **weather station** is a facility with instruments and equipment to make observations of atmospheric conditions in order to provide information to make weather forecasts and to study the weather and climate. The measurements taken include barometric pressure, humidity, wind speed, wind direction, and precipitation amounts. Wind measurements are taken as free of other obstructions as possible, while humidity measurements are kept free from direct solar radiation, or insulation. Manual observations are taken at least once daily, while automated observations are taken at least once an hour. *Investigation of ZigBee Wireless Sensors* was to demonstrate the functionality and versatility of ZigBee (low power wireless networks) technology by way of implementing a fully functional. *Wireless Weather Station* within the EEE building for remote data logging application using two low power, ZigBee sensor nodes.

ZigBee is targeted at applications that require a low data rate, long battery life, and secure networking. ZigBee has a defined rate of 250 kbit/s, best suited for periodic or intermittent data or a single signal transmission from a sensor or input device. Applications include wireless light switches, electrical meters with in-home-displays, traffic management systems, and other consumer and industrial equipment that requires short-range wireless transfer of data at relatively low rates. The technology defined by the ZigBee specification is intended to be simpler and less expensive than other WPANs, such as Bluetooth.

## II. EXPERIMENTAL SET

ZigBee is a standard defines a set of communication protocols for low-data-rate short-range wireless networking. ZigBee-based wireless devices operate 2.4 GHz frequency bands. The maximum data rate is 250 K bits per second. ZigBee is mainly for battery-powered applications where low data rate, low cost, and long battery life are main requirements.

1) To transmit a single variable to a receiver unit which outputs a 4-20mA or 0-10V signal corresponding to the input.
2) To transmit multiple input values to a receiver unit which provides either multiple 4-20mA or 0-10V outputs or a single Ethernet or RS232

connection. The transmitter and receiver units are identical unit's factory configured for either function.



**Figure 2.** Receiver Section

In the receiver section the ZIGBEE module can be used as receiver. This module receives the data send by the transmitters. The supply to the ZIGBEE module (3.3V) is given by the supply circuitry in fig with LM317.

To interface with the computer we have to convert the TTL logic into RS232 logic, for this purpose we use the IC MAX232. MAX232 is a dual driver/receiver that includes a capacitive voltage generator. The drivers ($T_1$ & $T_2$), also called transmitters, convert the TTL/CMOS logic input level into RS232 level. The transmitter (pin 10-T2 in) take input from ZIGBEE's data out pin (pin 2 of ZIGBEE) and send the output to RS232's receiver at pin 7 (T2 out) of MAX232. We use four capacitors, two for doubling the voltage and other two for inverting the voltage. The capacitors are connected between pin 1 and pin 3, pin 4 and pin5, pin 2 and VCC, and pin 6 and GND. The transmitter output (T2 out) from MAX232 (RS232 logic) is connected to pin 2 (receive data) of RS232 port. Thus the data received are given to PC. The pin 5 of RS232 port is connected to ground.

## III. SOFTWARE DESIGN FLOW

In software design, communication protocol layers have the energy conservation for the center. Take the communication between the sensor nodes and the network coordinator as an example to introduce the flow of communication between the ZigBee modules. Before making communication, ZigBee module need effective initialization, When the server receives weather data from sensor nodes, the server will check the weather data With notification value by using decision Tree techniques. If it matches with the pre-conditions, it will notify the system administrator and record of the notification and automatically store weather data to the database. The communication between sensor nodes and sink nodes, and exchange between sink nodes and networks coordination are similar. Software design mainly programmed with C# language combining for the collected data display, analysis and storage etc. When the server receives weather data from sensor nodes, the server will check the weather data with notification value by using decision Tree techniques. If it matches with the pre-conditions, it will notify the stem administrator and record of the notification and automatically store weather data to the database.

This research focuses on developing devices and tools to manage, display and alert the weather/disaster warnings using the advantages of a wireless sensor network system in mesh topology. The system can work over far distances. The system uses microcontroller and Xbee Wireless module base on the Zigbee/IEEE 802.15.4 standard. The developed system is very flexible and accurate. The developed system has core competency including 1) display weather information, 2) alert when weather conditions match using decision tree technique and 3) keep weather information statistics.

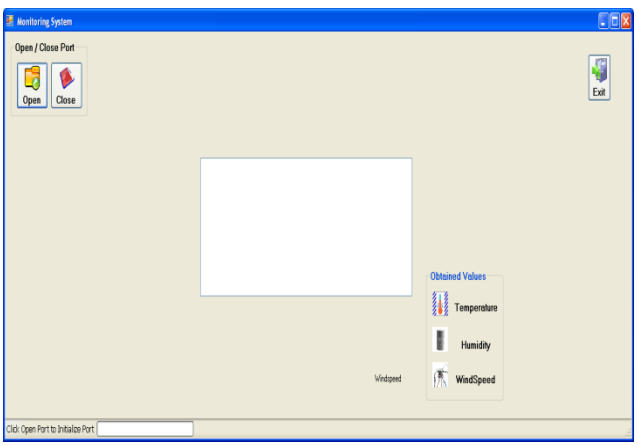


**Figure 3.** Output Section

Alarm system, we used decision tree to analyze and process the data. Each parameter has boundary values in decision tree process. Testing of the system used black box testing to test the performance and accuracy of the system. In the boundary values and is the expected output with real output. In this testing, rainfall and wind speed are simulated parameters. Testing results confirm that the system perfectly works.

It is feasible to construct a wireless for emergency response notification using IEEE and Zigbee. Moreover there is a range of sensing applications which can be developed using PHY along with ZigBee stack. This system has the potential to reduce the response time in a cost effective way. The system is robust and efficient methods can be incorporated to validate the threat by adding some additional options to the sensors, such as image processing and multiple sensors. This can help reduce false positives. This system now will be focusing on one aspect of the emergency detection, which is fire that occurs mostly in many campuses across the states. The system can be further developed to detect other emergencies such severe weather changes. The implementation of measuring and monitoring systems is represented by flexibility in topology of the sensor network. This offers the possibility to reorganize very rapidly the systems. Also the components of the ZigBee mesh networks can operate over extended periods of time, even years, without changing the original battery. Besides the ZigBee technology, the system presented in this peruses field programmable analog arrays for implementing the analog signal processing circuitry. This approach is also advantageous because offers the possibility to dynamically adjust the parameters amplification, filter cutoff frequencies of the analog front-end circuits, during circuit operation.

Wireless networks can have two distinct modes of operation: Ad hoc and infrastructure. Infrastructure wireless networks usually have a base station, which acts as a central coordinating node. The base station is usually AC provided in order to enable access to the Internet, an intranet or other wireless networks. Base stations are normally fixed in location. The disadvantage over ad hoc networks is that the base station is a central point of failure. If it stops working none of the wireless terminals can communicate with each other.

## IV. CONCLUSION

This research focuses on developing devices and tools to manage, display and alert the weather/disaster warnings using the advantages of a wireless sensor network system in mesh topology. The system can work over far distances. The system uses arduino microcontroller and Xbee Wireless module base on the Zigbee/IEEE 802.15.4 standard. The developed system is very flexible and accurate. The developed system has core competency including 1) display weather information, 2) alert when weather conditions match using decision tree technique and 3) keep weather information statistics. In the field testing, the specification of the device's communication range is 1 mile at the line of sight.When used in a real environment, the high-rise buildings, the system can work normally. The system can alert when the weather information matches with specified conditions.

## V. REFERENCES


[1] Yu Haibin, Zeng Pengliang, "Intelligent wireless sensor network system ,"Beijing: Science Press, 2006.289.

[2] Xu Z,Zheng H D,Liu Y D, "Research on mine monitoring system based on CAN," Journal of China University of Mining and Technology ,2004 33(4) : 421-423.

[3] TIAN Ze, "ARM7 embedded experimental development and practice, "Beijing: Beihang University Press 2006,pp.125167

[4] Microchip ZigBee specification Version 1.0,US: Microchip Technology lnc, 2005.433.

[5] Reza Mohamaddoust , Abolfazl Toroghi Haghighat, Mohamad Javad Motahari Sharif and Niccolo Capanni, "A Novel Design of an Automatic Lighting Control System for a Wireless Sensor Network with Increased Sensor Lifetime and Reduced Sensor Numbers", Sensors (2011) ,Volume No.- 11(9), pp. 8933-8952.

[6] De Dominicis, C.M.; Flammini, A.; Sisinni, E.; Fasanotti, L.; Floreani, F.; "On the development of a wireless self localizing streetlight monitoring system ", Sensors Applications Symposium IEEE, pp. 233 - 238 ,2011.

[7] Gustavo W. Denardin, Carlos H. Barriquello, Alexandre Campos, Rafael A. Pinto, "Control Network for Modern Street Lighting Systems", IEEE symposium on Industrial Electronics (ISIE),

(2011), pp. 1282 – 1289. [4Jing Chunguo, Wang Yan Sun, Wenyi Song, "Design of Street Light Pole Controller Based on WSN", The Tenth International Conference on Electronic Measurement & Instruments, ICEMI (2011), pp. 147 – 150.

[8] Chun-ling Fan and Yuan Guo, "The Application of a ZigBee Based Wireless Sensor Network in the LED Street Lamp Control System", International Conference on image Analysis and Signal Processing (IASP), 2011, pp. 501 – 504.

[9] Shentu, Xudan; Li, Wenjun; Sun, Lingling; Gong, Siliang, "A new streetlight monitoring system based on wireless sensor networks", International Conference on Information Science and Engineering, pp. 6394 – 6397, 2010.

[10] Wu Yue; Shi Changhong; Zhang Xianghong; Yang Wei; "Design of new intelligent street light control system ",, 8th IEEE international Conferences on Control and Automation (ICCA), ( 2010) , Page(s): 1423 – 1427.