

# ZigBee Based Industrial Water Parameter Monitoring and Control System

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## Abstract

*The parameters involved in the water quality monitoring such as the pH level, turbidity and temperature is measured in real time by the sensors that send the data to the base station or control/monitoring room. As the monitoring is intended to be carried out in a remote area with limited access, signal or data from the sensor unit will then be transmitted wirelessly to the base monitoring station.*

*The application of wireless sensor network (WSN) for a water quality monitoring is composed of a number of sensor nodes with networking capability. Such monitoring system can be setup emphasizing on the aspects of low cost, easy ad hoc installation, easy handling and maintenance. The use of wireless system for monitoring purpose will not only reduce the overall monitoring system cost in terms of facilities setup and labor cost, but will also provide flexibility in terms of distance or location. In this paper, the fundamental design and implementation of WSN featuring a high power transmission Zigbee based technology together with the IEEE 802.15.4 compatible transceiver is proposed. It is chosen due to its features that fulfill the requirement for a low cost, easy to use, minimal power consumption and reliable data communication between sensor nodes.*

*The development of graphical user interface (GUI) for the monitoring purposes at the base monitoring station is another main component discussed in this paper. The GUI should be able to display the parameters being monitored continuously in real time. The developed GUI platform using VB is cost-effective and allows easy customization.*

**Keywords:** ZigBee, Water Parameters.

## I. INTRODUCTION

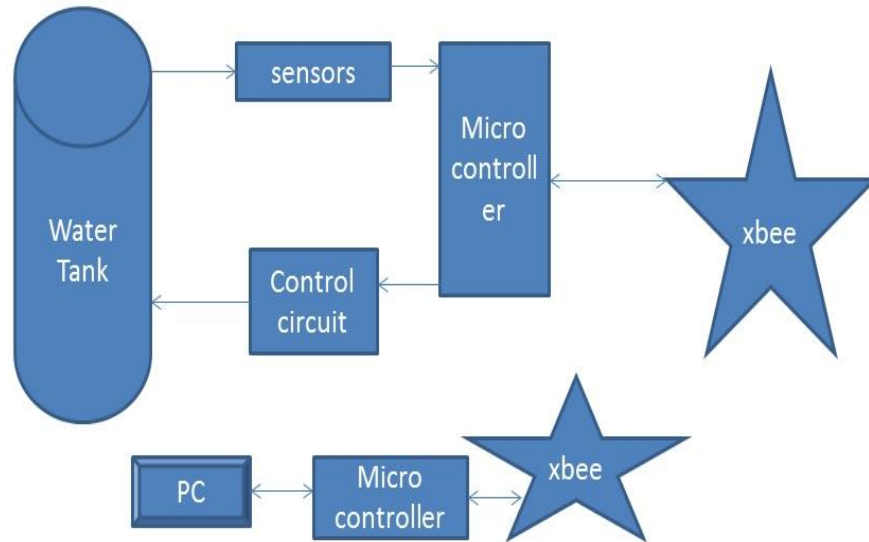
Water is a limited resource and is essential for agriculture, industry and for creatures' existence on earth including human beings. Water quality monitoring is essential to control the physical, chemical and biological characteristics of water. It provides information about the current health of the water body, whether the water body meets the designated use and how it has changed over time. Information gathered can be used to suggest that the water body requires improvement to meet its designated use and lead to actions to protect and restore the health of the water body. For example, drinking water should not contain any chemical materials that could be harmful to health; water for agricultural irrigation should have low sodium content; water for industrial uses should be low in certain inorganic chemicals. In addition, water quality monitoring can help with water pollution detection, discharge of toxic chemicals and contamination in water.

Temperature, pH and turbidity are the typical parameters collected in river/lake water quality monitoring systems. The goal of this project is to design and manage a Wireless Sensor Network (WSN) that helps to monitor the quality of water with the help of information sensed by the sensors immersed in water, so as to keep the water resource within a standard described for domestic usage and to be able to take necessary actions to restore the health of the degraded water body. A WSN featuring a high power transmission Zigbee based technology together with the IEEE 802.15.4 compatible transceiver is chosen because of the simplicity of its deployment, low cost, minimal power consumption, reliability and high scalability.

## II. PROBLEM STATEMENT

The proposed system will allow us measure the pH. between the range 1 to 14. Arduino will allow us to control the system efficiently. ZigBee will reduce the complexity of the circuit as it is easier to use as compared to that of other protocols such as GSM etc.

### III. RELATED WORK



We will analyze the Ph. and temperature of water. We will design a wireless network using ZigBee technology. We will design an application using VB which could be used in control room. Using zigbee we will be able to do communication wirelessly between our site and control room. We will control the ph. using solutions like HCl and NaOH. The technology defined by the ZigBee specification is intended to be simpler and less expensive than other wireless personal area networks(WPANs), such as Bluetooth or Wi-Fi. Applications include wireless light switches, electrical meters with in-home-displays, traffic management systems, and other consumer and industrial equipment that requires short-range low-rate wireless data transfer. Its low power consumption limits transmission distances to 10–100 m line-of-sight, depending on power output and environmental characteristics. ZigBee devices can transmit data over long distances by passing data through a mesh network of intermediate devices to reach more distant ones. ZigBee is typically used in low data rate applications that require long battery life and secure networking (ZigBee networks are secured by 128bit symmetric encryption keys.) ZigBee has a defined rate of 250 kbps, best suited for intermittent data transmissions from a sensor or input device. ZigBee was conceived in 1998, standardized in 2003, and revised in 2006. The name refers to the waggle dance of honey bees after their return to the beehive. Arduino is an open-source prototyping platform based on easy-to-use

hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

### IV. RESULTS AND DISCUSSION

#### A. Temperature:

Generally, the weather in study area is quite cool, however the water temperature plays an important factor which influences the chemical, bio-chemical characteristics of water body. The maximum temperature of 270 C was recorded in May and a minimum of 200 C was recorded in month of December in the year 2007. Water Temperature in summer, was high due to low water level, high temperature and clear atmosphere.

#### B. ph.

Ph. of pure water is exactly 7. Ph. of water used in sugar industries is between 6 to 8. Ph. of water used in textile industries is about 8.

## V. CONCLUSION

We will analyze the Ph. and temperature of water. We designed a wireless network using ZigBee technology. We designed an application using VB which could be used in control room. Using zigbee we are able to do communication wirelessly between our site and control room. We will control the ph. using solutions like HCl and NaOH.

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