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Analysis of Water Reservoir's Parameters using Wireless Sensor Network (WSN) System

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Abstract: *Fresh water reservoirs can be impacted by several hazardous substances through inputs from agricultural activities, sewage discharges, ground-water leaching and runoffs. The water quality assessment is very important for water quality information sharing of the monitoring and remediation programs to minimize the risk promoted by hazardous substances in aquatic ecosystems. The application of this type of index has clear advantages allowing a comprehensive evaluation of the effects from all the important water components and parameters including those due to unknown substances. The Measuring Parameters of Water Reservoir using Wireless Sensor Network (WSN) System is proposed in this paper. This system based on analysis of water quality using physic-chemical parameters in reservoirs at any time and also uses GSM (Global System for Mobile) technology. It consists of two parts: data monitoring nodes which is also called "mote" and remote monitoring center which is "main station board". This system is suitable for the complex and large-scale water reservoirs such as for lakes, rivers, pond, fountain, swamps, deep groundwater and other reservoirs. This paper is devoted to the explanation and illustration for our new water parameters measuring system. The system collects, transmits and processes water quality parameters automatically, so production efficiency and economy benefit can improve greatly. The system had successfully accomplished the auto-measuring of the water temperature, level of water, total dissolved solids in water, flow of water and turbidity present in water reservoir.*

Keywords: *Wireless Sensor Network, Microcontroller, different sensors to measuring parameters.*

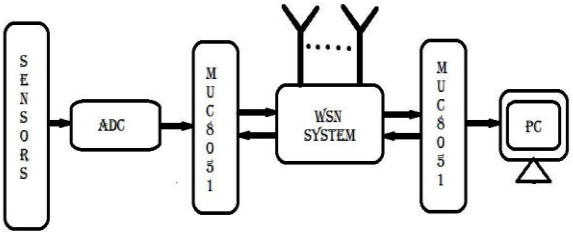
1. INTRODUCTION

The Measuring Parameters of Water Reservoir using Wireless Sensor Network (WSN) System is proposed in this paper. Two popular technologies, embedded technology and wireless technology have been applied to the design of this system. The embedded technology used because of its low power consumption, small size and easy to understand. The GSM system has a powerful multiuser management compatibility, high security performance, high quality service, and high efficiency of spectrum speed.

The water quality assessment is very important for water quality information sharing of the monitoring and remediation programs to minimize the risk promoted by hazardous substances in aquatic ecosystems. The results are to be used for developing a monitoring program for water quality information sharing, including biological methods.

The system collects, transmits and processes water quality parameters automatically, so production efficiency and economy benefit are improved greatly.

Practice has proven GSM technology can achieve well within the complex environment of poor water quality unmonitored, and more specifically applicable to the collection point, data transmission automatically generate the field of water analysis equipment data transmission and monitoring.



The Measuring Parameters of Water Reservoir using Wireless Sensor Network (WSN) System is basically measures different parameters, and send it to the main station board, t hat displays on PC, through GSM (Global system for mobile communications).

2. THEORY

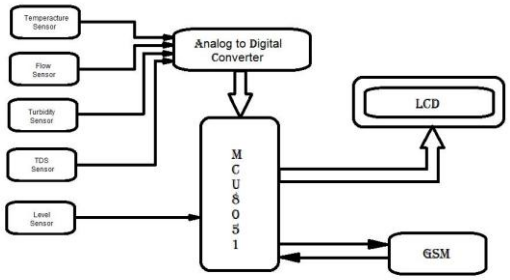
Water is very necessary in our daily life. Lake water is an essential renewable resource for mankind and the environment and it is important for civil drink water supply. We get our drinking water from reservoir. With the acceleration of urbanization, the phenomenon of urban drinking water pollution is quite obvious.

The water quality parameters collected by multi-parameter water quality probe are transmitted to data processing and monitoring centre through GSM wireless communication network.

The two main parts of the system are:

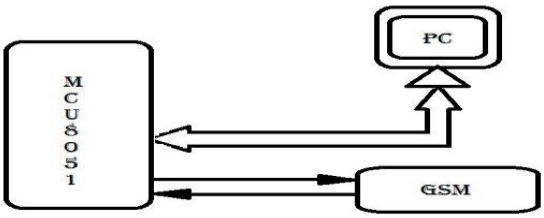
1. **Data monitoring nodes**:

A data monitoring node, also known as a mote (chiefly in North America), is a sensor node in a wireless sensor network that is capable of performing some processing, gathering sensory in formation and communicating with other connected nodes in the network and the main station boa rd. The main components of a sensor node are a microcontroller, transceiver, external memory, power source and one or more sensors, A/D and D/A convertors. All the sensors give data to A/D convertor. This A/D converter converts analog data which is given by sensors to digital data. After converting it sends digital data to microcontroller 8051. This data is send to the main station board through GSM. And the result or data obtained is produced or displayed in LCD.



2. Main station board:

The remote monitoring center which is our "main station board" collects the data from different modes through wireless sensor network and transmits it to the PC. The main components of main station board are microcontroller, transceiver, external memory, power source and PC to show the data.



Microcontroller:

A microcontroller is often used in many embedded systems such as sensor nodes because of its low cost, flexibility to connect to other devices, ease of programming, and low power consumption. A general purpose microprocessor generally has higher power consumption than a micro controller; therefore it is often not considered a suitable choice for a sensor node. In this system we use P89V51RD2 microcontroller, which is an 89C51 microcontroller. The AT89C51 is a low-power, high-performance CMOS 8-bit microcomputer with 4K bytes of Flash Programmable and Erasable Read Only Memory (PEROM). It is a powerful microcomputer which provides a highly flexible and cost effective solution to many embedded control applications.

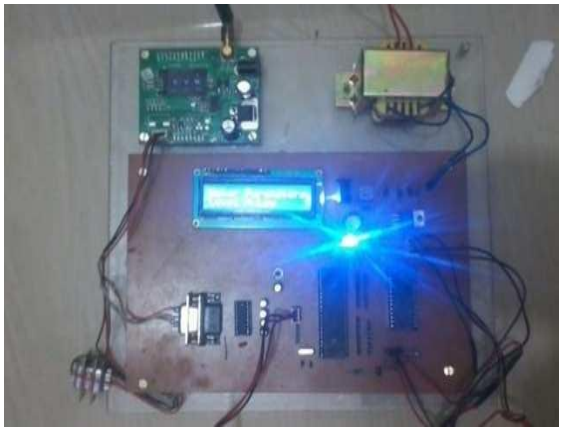
Wireless Sensor Network (WSN):

A wireless sensor network (WSN) platform must provide support for a suite of application-specific protocols that drastically reduce node size, cost, and power consumption for their target application. **GSM** (**Global System for Mobile**

Communications, originally **Group Special Mobile),** is a standard set developed by the European Telecommunications Standards Institute (ETSI) to describe protocols for second generation (2G) digital cellular networks used by mobile phones. The GSM system is basically designed as a combination of three major subsystems: the network subsystem, the radio subsystem, and the operation support subsystem.

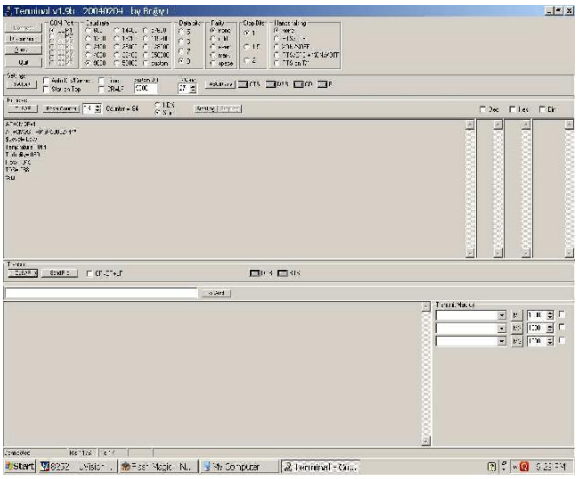
The system is shown in figure below. It is main station board which has two connecters, first is connected to GSM module and other is connected to PC through serial cable. The GSM module receives data from node; send it to PC through microcontroller.

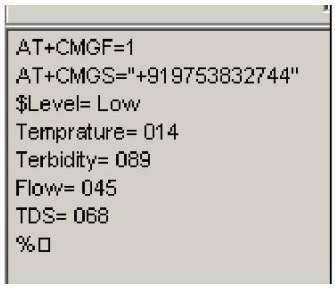
It is data monitoring node which is connected to sensors, and a GSM module using serial cable. An LCD is also connected with this board to display the data which it receives from sensors.



3. RESULT

We collected water from different sources and found the values of different parameters like this:





4. CONCLUSION

A wireless sensor network was developed in the hope of tackling with the problem of the lack of a practical environment monitoring system. It presents us with useful features such as large monitoring ranges, flexible configuration, low power consumption, small or negligible damage to the natural environment and low cost.

In our system, we showed how to automate the process of getting the water qualities readings with a WSN system. Our system is cost efficient in terms of manpower, time consumption and budget. Using this system, will give the readings for different parameters depending on the type of sensors and program coding.

5. FUTURE SCOPE

We can add more sensors to know more about water quality parameters like dissolved oxygen, electrical conductivity, colour, taste and odour, hardness, dissolved oxygen, un-ionized ammonia, nitrite, nitrate, carbon dioxide, alkalinity, solids and pH. It can be used to represent data from different sensors in graphical format, like bar graph, in different interval to know about changes in reservoir. We can also connect the different nodes to each other by which can send data from one node to another if is there any connection problems between node and main station board. It can be used as monitor and control system to maintain various parameters values like temperature, pH, level etc.

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