# WATER MONITORING SYSTEM FOR DAM

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**Abstract: This paper belongs to measuring the parameters of water by using sensors and wireless network. The parameters like temperature, pH level, Water level, etc. are sensed by the sensors and sent to the base station or the monitoring room wirelessly. The wireless network system use for monitoring purpose will not be reduced cost the overall monitoring system cost in term of facility setup and labour cost. But will also provide flexibility in term of distance and location. In this project the wireless network is zig-bee based technology. It is select due to its advantage. It is long distance communication system. It fulfil the requirement for low cost, minimal power consumption .then MATLAB software use for display the information of water dam system.**

***Keywords*****water quality monitoring, wireless sensor network,Zig-bee technology**

## 2.INTRODUCTION

Dam monitoring system is wireless communication system which is used for monitoring the parameters of water in dam like temperature, water level, PH level etc.

Water is a limited resource and is essential for agriculture, industry and for creature 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.

With the fast development in industry, water pollution has become a serious problem that upsets the world. To deal with this problem, varieties of water monitoring systems have been developed.

In general, dam monitoring systems are wire based, and the sensors are deployed at few criticalpoints in the structure and connected to a central Data Acquisition (DAQ) module over a cable,generally a co-axial cable

The wired systems throw up a host of issues, and the primary problemsare their installation and maintenance. Laying out the cabling is expensive and time consuming,which results from the large sizes of structures and the installed points which are generally hard to reach.

To overcome the many disadvantages of the wired systems, uses of wireless technologies havebeen proposed for structural monitoring with the advent of low cost wireless technologies,such as Bluetooth, Zig-bee, etc.

Information gathered can be used tosuggest that the water body requiresimprovement 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 typicalparameters 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 sensorsimmersed 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 Zig-bee based technology together with the IEEE

e802.15.4 compatible transceiver is chosen because of the simplicity of its deployment, low cost, minimal power consumption, reliability and high scalability

The development of graphical user interface (GUI) for the monitoring purpose at the base monitoring station is another main component in the project. The GUI should beable to display the parameters being monitored .

3)Hardware design

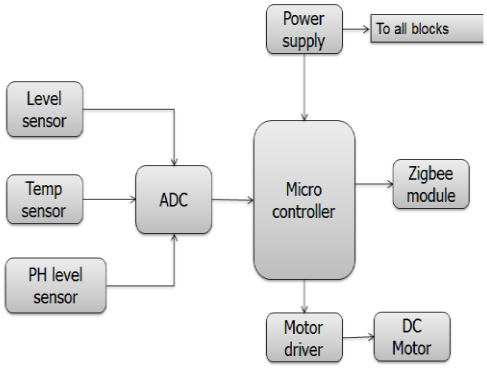


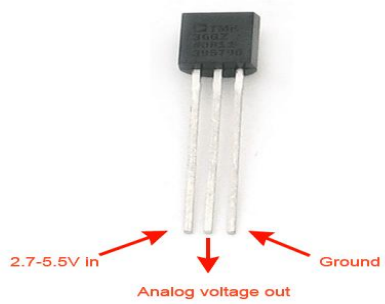

Fig a) Transmitter diagram of dam monitoring system

**A. Sensor Unit**

A sensor unit basically consists of several sensors used to detect the predetermined parameters that indicate the quality of water.In this work, three types of sensor; pH sensorthat senses the acidity or basicity of the water, temperature sensorthat senses the temperatureof the water, and water level sensorthat senses the level of water based on transistor are used.

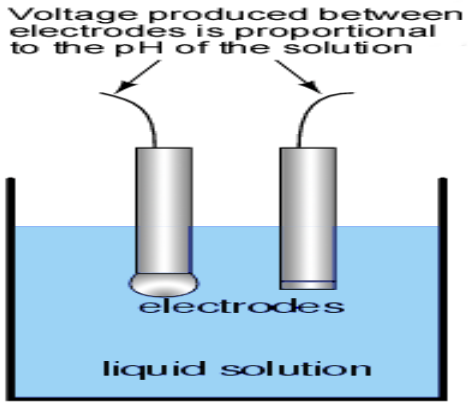
1) LM35 TEMPRATURE SENSOR'

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling.

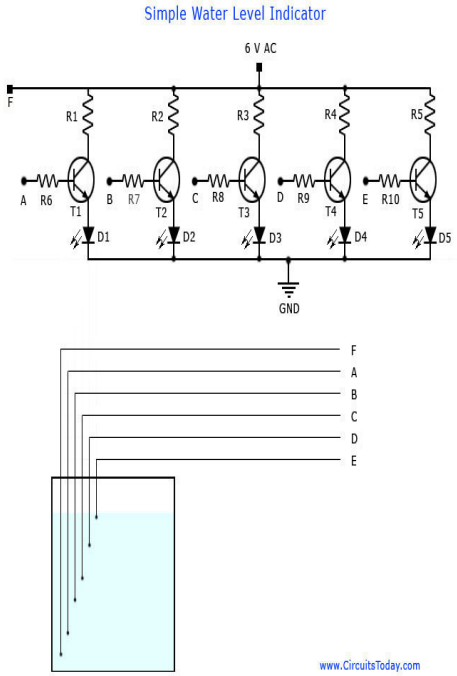



2) pH sensor

pH measurement loop is made up of three components, the pH sensor, which includes a measuring electrode, a referenceelectrode, and a temperature sensor; a preamplifier; and an analyser or transmitter. A pH measurement loop is essentially a battery where the positive terminal is the measuring electrode and the negative terminal is the reference electrode. The measuring electrode, which is sensitive to the hydrogen ion, develops a potential (voltage) directly related to the hydrogen ion concentration of the solution. The reference electrode provides a stable potential against which the measuring electrode can be compared.



## WATER LEVEL SENSOR

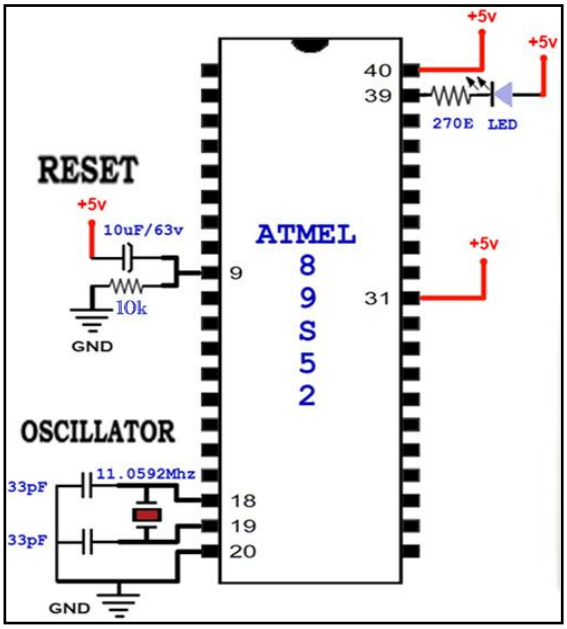



This is the circuit diagram of a simplecorrosion free water level indicator for home and industries. In fact the the level of any conductive non corrosive liquids can be measured using this circuit. The circuit is based on 5 transistor switches. Each transistor is switched on to drive the corresponding LED , when its base is supplied with current through the water through the electrode probes.

One electrode probe is (F) with 6V AC is placed at the bottom of tank. Next probes are placed step by step above the bottom probe. When water is rising the base of each transistor gets electrical connection to 6V AC through water and the corresponding probe. Which in turn makes the transistors conduct to glow LED and indicate the level of water. The ends of probes are connected to corresponding points in the circuit as shown in circuit diagram.Insulated Aluminium wires with end insulation removed will do for the probe. Arrange the probes in order on a PVC pipe according to the depth and immerse it in the tank.AC voltage is use to prevent electrolysis at the probes. So this setup will last really long. I guarantee at least a 2 years of maintenance free operation. That's what I got and is still going

**B. Wireless Sensor Node**

The wireless sensor node in this work consists of sensor unit as mentioned above; a microcontroller with the task of signaldigitizing, data transmission, networking management etc; and radio frequency transceiver for communications at the physical layer. The main microcontroller of the sensornode is AT89S52. The high power transmission type Zig-bee module is using transceiver IC4214A that complies to the IEEE 802.15.4 standard. The transceiver IC isintegrated with the microcontroller with a low power but high performance of 64kB programmable flash features. The modulealone requires a 5VDC power supply, multiplesensor inputs/outputs with ADC, operating at afrequency of 2.4 GHz .and its range is approximately 100 meter.




**C. Base Monitoring Station**

The base station consists of the same Zig-bee module programmed as a coordinator that receives the data sent from the sensor nodes (end devices and routers) wirelessly. As the coordinator needs to continuously receive data from the end devices, it is normally mains powered. Data received from the end device nodes is sent to the computer using the

RS 232 protocol and data received is displayed using the built GUI on the base monitoring station.

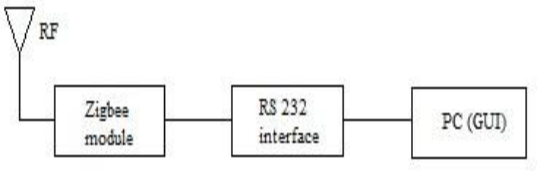



Fig b) receiver diagram of dam monitoring

IV. SOFTWARE DESIGN

The GUI platform was successfully developed using the MATLAB software that was able to interact with the hardware (coordinator) at the base station.

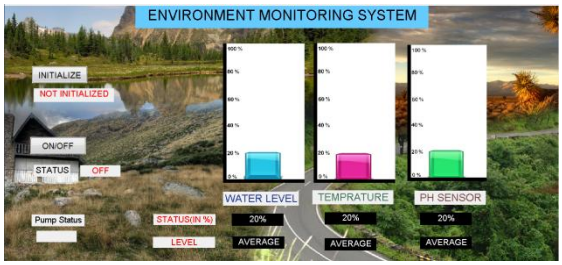



Fig.5 Layout Design of the front end of the GUI

Once the battery power is on sensor node is turned on, the temperature, pH and levelsensors immersed in water start sensing the respective. Once the user clicks on any of the initialise buttons of the panel the zig-bee transceiver on the receiver side sends a signal to the zig-bee transmitter on the transmitter side demanding the corresponding data values to be sent. The „Graph" ON/OFF buttonplots the different values that are obtained at the receiver side. When user clicks on ON/OFF button then parameter of water will be display the ranges of ph , tem., level of water on MATLAB screen.

V. SIMULATION AND RESULTS

**pH Measurements And Results**

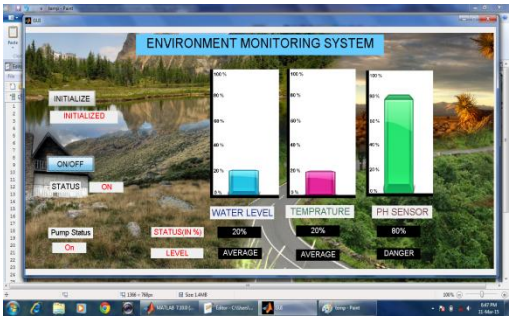



Fig.6.1 The graph for the received pH values is plotted

From prior testing, we define a thresholdValue(range of values) for the monitoring ofpH of water. Depending on whether theaverage of the values obtained is less than orgreater than the defined threshold, we get toknow whether the water is pure or impure andand when water get start impure .it will reach upto 80%then switch will be on and moter get start fo filter process of water.

**B. Temperature Measurements And Results**

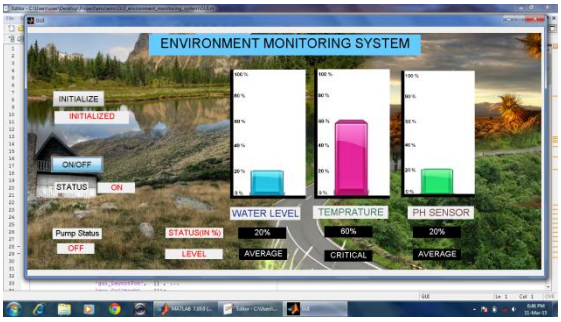



Fig.7.1 The graph for the received temperature value

From prior testing, we define a threshold value (range of values) for the monitoring oftemperature of water.Depending on whether the average of thevalues obtained is less than or greater than thedefined threshold , we get to know whether the temperature of the water is high or low and hence if it is suitable or not for the specific purpose.

## C. level Measurements AndResults

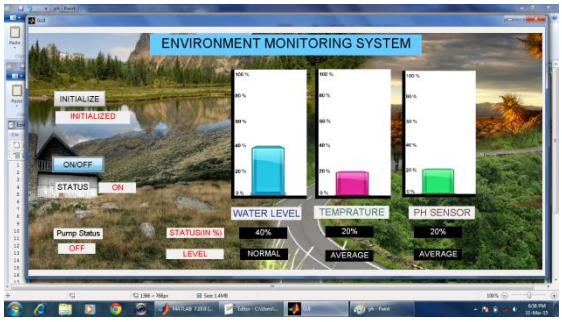



Fig.8.1 The graph for the received turbidity values isplotted and average is calculated

From prior testing, we define a thresholdValue(range of values) for the monitoring of turbidity level of water. Depending on whether the average of the values obtained is less than or greater than the defined threshold, we get to know whether the water is pure or impure and hence if it is suitable or not for the specific purpose.

## VI. CONCLUSION

The main issue that is being addressed inthis project is about developing an efficient wireless sensor network (WSN) based water quality monitoring system,that examines „water quality“ , an important factor as far as,irrigation, domestic purposes, industries, etc. are concerned.Overall, the proposed implementation ofhigh power Zig-bee based WSN for waterquality monitoring system offering low power consumption, and long battery life is presented. The use of high power WSN is suitable for activities in industries involving large area monitoring such as manufacturing, constructing, mining etc. Another important fact of this system is the easy installation of the system where the base station can be placed atthe local residence close to the target area and the monitoring task can be done by any person with minimal training at the beginning of the system installation.

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