Real Time Water Quality Analysis Systems and Predation Modeling using Embedded Systems

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Abstract— This paper describes the WSN technology for monitoring the water data and also provides security and generates water quality analysis and index based on the modeling of the predation graphs using different linear interpolation techniques The Design of Wireless sensor network based on WIFI module and arduino board and GSM .The use of wireless sensors gives us a more precise way to get the water quality status at different places and may allow the easy deployment of monitoring stations at places of difficult access without the manual data retrieval. The aim of the project is to design a real time system for monitoring drinking water quality and quantity at customer sites. Using different sensors, this system will collect various parameters from water, such as pH, turbidity Conductivity et There is a set point for each parameters when these particular parameter Crosses its set point then and after every one minute time SMS sends on management mobile which contain the readings of measured water parameters, due to which it is possible for that management person to take Appropriate action in emergency.

Key words: WSN, pH, GSM, Turbidity, chloride etc matlab interpolation

I. INTRODUCTION

Every living thing on earth needs water to survive. Water found in nature contains a number of impurities in varying amounts. As water is a universal solvent, water absorbs number of impurities in various ways like water runoff, etc. The impurities which are picked up by the water as suspended water sometimes make it more useful and suitable for drinking, but sometimes, it may make water totally harmful and unfit for drinking purpose and sometimes unfit for some other purposes. In some places such as in [1] describes that the pollutant effluent derived from mining sites has affected the underground water source such as wells, one of the important water source for people in rural area. Water quality is always an enormous issue, partly because of the tremendous growth of population & urban expansion and development. The quality of water will not suffer, if people are diligent. So in a water supply project, quality of water is an important factor. Water quality analysis is the analysis of raw water to know various impurities present in it and for deciding the treatment of water.

II. PROPOSED SYSTEM

This system is implemented using arduino and WIFI combination. It will work as WSN. Various Sensors are connected to board via inbuilt ADC and output of sensor is nothing but the measured parameters from respective slaves. Sensors are placed inside the water to acquire the different parameters. The arduino is connected to the WIFI module through RS 232.The WIFI module have its range 30 meter from the slaves. By selecting the different WIFI technologies we can increase the distance between Master and the Slaves.

Entire system contains six sensors to measure six parameters of water. pH, Temperature, turbidity, water level, humidity etc .These sensors are installed at each node in target area. Measured parameters are analog in nature we converted it in digital form by using inbuilt ADC.

The proposed system block diagram is shown in below fig

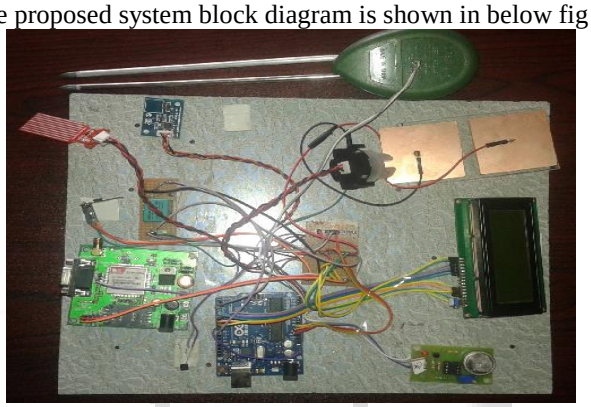

Fig. 1: Transmitter section

Fig. 2: Receiver

III. SENSORS USED

Temperature sensor: Temperature sensor is used to sense the temperature parameter. We have used a Temperature sensor called LM35.

A. Water Level Sensor

A water level is typically used to measure the depth/level of liquid in the container. As the water rises and reaches the level of the water level switch, it begins to water level going from the vertical to the horizontal level.

B. pH Sensor

The pH unit measures the degree of acidity or basicity of a solution. To be more exact, pH is the measurement of the hydrogen ion concentration, [H+]. Every aqueous solution can be measured to determine its pH value. This value

ranges from 0 to 14 pH. Values below 7 pH exhibit acidic properties. Values above 7 pH exhibit basic (also known as caustic or alkaline) properties. Since 7 pH is the center of the measurement scale, it is neither acidic nor basic and is, therefore, called "neutral."

– Turbidity Sensor: Turbidity is amount of suspended particles in the water. it is actual measurement of transparency of water. Normal turbidity of water is 5 NTU
– GSM operation: Here we are using the GSM technology for providing the alert information to the users. The SIM900D is a complete Quad-band GSM/GPRS solution. The SIM900D delivers GSM/GPRS 850, 900, 1800, 1900MHz performance for voice Data, SMS and Fax in a small form factor and with low power consumption. It is designed with a very powerful single-chip

C. Wi-Fi

HLK-RM04 is a new low-cost embedded UART-ETHWIFI module (serial port - Ethernet -Wireless network) developed by Shenzhen Hi-Link Electronic co., Ltd. This product is an embedded module based on the universal serial interface network standard, built-in TCP / IP protocol stack, enabling the user serial port, Ethernet, wireless network (wife) interface between the on versions. Through the HLKRM04 module, the traditional serial devices do not need to change any configuration; data can be transmitted through the Internet network. Provides a quick solution for the user's serial devices to transfer data via Ethernet.

IV. SOFTWARE APPROACH FOR PREDATION MODELING

Interpolation methods are frequently used to estimate values of physical or chemical constituents in locations where they are not measured. Very little research has been conducted, however, to investigate the relative performance of different interpolation methods in surface waters. The study reported here uses archived water quality data from the Nunna to Agiripalli and compares two spatial interpolation methods:

A. Linear Interpolation

Given (x_0, y_0), (x_1, y_1), fit a linear interpolate through the data. Note that $y_0 = f(x_0)$ and $y_1 = f(x_1)$, assuming a linear interpolate means: $f_1(x) = b_0 + b_1(x - x_0)$

B. Spline Method of Interpolation

Spline method was introduced to solve one of the drawbacks of the polynomial interpolation. In fact, when the order (n) becomes large, in many cases, oscillations appear in the resulting polynomial. In Mathematics, a spline is a special function defined piecewise by polynomials.

C. Results

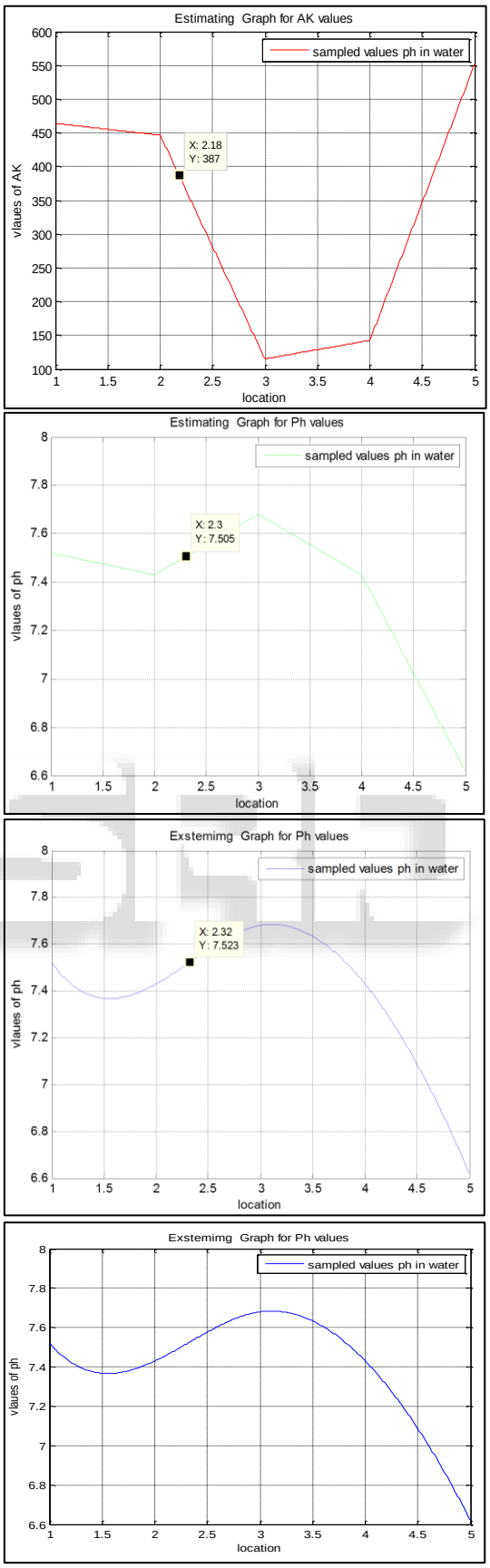

Fig. 3: From graphs we can assume that 1.Nunna 2.Surampalli, 3.Madhalavarigudam, 4.Adavinekkalam 5 Akiripalli

V. CONCLUSION

Finally, we concluded that in this project we are going to design and implementing the Real time water Quality Testing and monitoring Systems and we can generate predation modal graph for different location for different parameters like PH, EC, Hardness, etc. using different interpolation techniques like linear interpolation techniques and spline interpolation. This system and methodology will give the result of up to 90% accuracy.

VI. FUTURE SCOPE

The feature scope of this project is, the methods which are employed in this project had limitation which can be overcome new interpolation Techniques.

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