Application of Wireless Sensor Network in Water Monitoring System

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Abstract: The contamination in water is expanding step by step, and numerous specialists and researchers are attempting to take care of the issue by checking and keeping up the nature of water. Poor water quality spreads sickness, causes passing and hampers financial advancement. The point of the paper is to test the water quality in real time with the goal that it will be continuously to guard human life from the dirtied water. Our paper features on checking the parameters of water like temperature, pH and turbidity by using temperature, pH and turbidity sensors. The sensors esteems can be determined utilizing core controller, Arduino atmega 2560 goes about as core controller. At long last, the information can be seen on PC screen utilizing application Arduino LTE.

Key Words: Arduino atmega 2560, water monitoring, chloramines

1. INTRODUCTION

In today’s world part of innovative headways are being done and yet there are issues brought about by toxins, modern bio-dangers which are dumped in new water waterways, lakes. An answer in such manner is critical and this task centers around taking into account all the specialized and monetary perspectives. The undertaking features the whole water quality observing techniques, sensors, implanted structure, and data dissemination method, job of government, and townspeople in guaranteeing appropriate data scattering. Monitoring of these water bodies is important so it very well may be appropriate for drinking and farming purposes. In existing customary water quality checking frameworks, the contaminants, and pathogen in the water create every now and again since they have been utilized for a long time. Our paper centers around water checking by estimating parameters, for example, temperature, pH, turbidity. Apart from monitoring it also filters the water by adding chloramines to the contaminated water. pH estimates whether the water is acidic or alkaline. pH is a size of acridity from 0 to 14. It tells how acidic or basic a substance is. Progressively acidic arrangements have lower pH. Progressively basic arrangements have higher pH. Substances that aren't acidic or antacid (that is, impartial arrangements) more often than not have a pH of 7. Turbidity is a proportion of how much the water loses its straightforwardness because of the nearness of suspended particulates. On the off chance that a lot of suspended solids are available in water, it will seem turbid in appearance. The turbidity relies on fineness and centralization of particles present in water. The unit of articulation is Nephelometric Turbidity Unit (NTU). The IS esteem for drinking water is 10 to 25 NTU. Turbidity sensor recognizes water quality by estimating dimension of turbidity. It can distinguish suspended particles in water by estimating the light transmittance and dissipating rate which changes with the measure of absolute suspended solids (TSS) in water. While the temperature sensor estimates the temperature of the framework. These sensor-values are processed by the microcontroller and theses processed values are sent to the core controller. Chloramines when added to water it cleans the water and executes the germs. Chloramines is now and then utilized as an option in contrast to chlorination.

Motivation:

Fresh water contamination is a worldwide issue and not impossible to miss to India. Be that as it may, rising contamination of waterways in India is a noteworthy worry for the Indian government and population. Water Pollution is a noteworthy worldwide issue which requires progressing valuation and change of water asset core value at the dimensions of universal down to singular wells. According to a world bank report titled ‘Issues and Priorities for Agriculture’, India has about 195 million hectares of land under cultivation. Of this, about 63% or nearly 125 million hectares is rain-fed, while remaining 37% or 70 million hectares of the agricultural land depends on irrigation. Generally, rivers around agricultural zones provide much-needed water for irrigation. Hence in this paper we depict the plan of sensors that screens the nature of water with the assistance of data detected by the sensors submerged in water, in order to keep the water asset inside a standard portrayed for household use and to have the capacity to take essential activities to reestablish the soundness of the debased water body. Utilizing distinctive sensors, this framework can gather different parameters from water, for example, temperature, pH, turbidity, etc.
Objective:

1) It should be cost effective and act as an alternative for high cost monitoring system.

2) Implement must be suitable for environment monitoring and data monitoring.

3) Data should be analyzed on real time.

4) All the parameters like temperature, pH and turbidity should be monitored on a single instrument.

5) Less energy consumption by using solar cell.

6) Water must be purified and be suitable for drinking and irrigation purposes.

Methodology: The block diagram shows the overview of the system. Each and every block diagram of the system is explained in detail. Impure water from the fresh water sources like lakes, rivers etc. is drawn using a water pump. The water pump is powered using solar cell to save energy resources. The water drawn is monitored by using water monitoring system. Water monitoring is done by using several sensors like temperature, pH, turbidity. These sensors are connected to the micro controller and then connected to the Arduino which helps measuring temperature, pH, turbidity. Arduino is used as a core controller. the sensor data can be viewed on the display. After the water is done being monitored its filtered to get rid of turbidity. After the turbidity is being taken care of chloramines are added to get rid of disinfectants. This process is repeated to ensure water is clean for drinking and agricultural purposes.
The components are explained in detail:

1) Solar cell:

Power. Sun-based cell really involves many, smaller units called photovoltaic cells. (Photovoltaic essentially a sun-oriented cell works by permitting photons, or particles of light, to thump electrons free from ions, creating a progression of implies they convert daylight into electricity.). It encourages us in driving the water motor. In essential terms, a solar cell can create a most extreme voltage of roughly 0.5 to 0.6 volts.

2) Pumping motor:

It is basically used to pump water from opposite to gravity. A water pump works by an electrical motor that rotates the pump to increase flow. Pump is used to pump water to the reservoir. Air is pushed out of the way by an impeller which moves the air fast causing a lower pressure which then draws the water in. It uses basic forces of nature.

3) Arduino ATMega 2560

The Arduino Mega 2560 is a microcontroller board dependent on the ATmega2560. It has 54 advanced info/yield pins (of which 15 can be utilized as PWM yields), 16 simple data sources, 4 UARTs (equipment sequential ports), a 16 MHz precious stone oscillator, a USB association, a power jack, an ICSP header, and a reset catch. It includes everything expected to help the microcontroller; essentially interface it to a PC with a USB link or power it with an AC-to-DC connector or battery to begin.

4) pH sensor:

pH sensor is a sensor which distinguishes pH estimation of water. pH is the hydrogen-particle focus in water-based arrangements which shows the sharpness and alkalinity in the arrangement. A pH estimation circle is comprised of three segments, the pH sensor, which incorporates an estimating terminal, a reference cathode, and a temperature sensor; a preamplifier; and an analyzer or transmitter. A pH estimation circle is basically a battery where the positive terminal is the estimating anode and the negative terminal is the reference cathode. The estimating terminal, which is delicate to the hydrogen particle, builds up a potential (voltage) straightforwardly identified with the hydrogen particle grouping of the arrangement. At the point when submerged in the arrangement, the reference cathode potential does not change with the changing hydrogen particle focus. An answer in the reference terminal likewise reaches the test arrangement and the estimating cathode through an intersection, finishing the circuit. Yield of the estimating cathode changes with temperature (despite the fact that the procedure stays at a steady pH), so a temperature sensor is important to address for this adjustment in yield. This is done in the examinations or transmitter programming.

5) Temperature sensor:

A temperature sensor is a gadget that recognizes and measures hotness and coolness and changes over it into an electrical signal. These sensors utilize a strong state system to decide the temperature. In other words, they don't utilize mercury, bimetallic strips, nor do they use indoor regulators. Rather, they utilize the reality as temperature builds, the voltage over a diode increments at a known rate. In fact, this is really the voltage drop between the base and emitter - the Vbe - of a transistor. By decisively enhancing the voltage change, it is anything but difficult to produce a simple signal that is corresponding to temperature.
Working:

1.1 The structure of water checking framework fundamentally comprise of 3 sections:

1) hardware
2) software
3) filter

The equipment comprises of solar cell, water motor, Arduino atmega 2560, temperature sensor, pH sensor, and turbidity sensor. So hardware does all the significant working like pumping the water, fueling the water pump utilizing sun powered cell, checking all the fundamental variables like temperature, pH and turbidity. The software part comprises of Arduino LTE which controls the Arduino by utilizing directions. It utilizes microcontroller to peruse every one of the sensors. it also helps in displaying the values of the sensors on the software itself. The filtration strategy is done physically in which the water is filtered and chloramines are included for cleansing of water.

Future Scope:

1) In future we use IOT idea in this venture
2) Detecting the more parameters for most secure reason
3) Increase the parameters by expansion of different sensors
4) By interfacing transfer we controls the supply of water

Conclusion:

We have set up that water observing requires a greater expense which isn’t reasonable by the provincial bodies in India. Our paper conveys observing at a lower cost and furthermore disposes of undesirable turbidity, checks the pH esteem and adds chloramines to help with sterilization of water. this is conceivable because of continuous checking done by the sensors constrained by the core controller. This system can also be modified and be used to measure air pollution, industrial wastes, pH of chemicals, harmful chemicals used during addition of pesticides on foods, fruits, etc. it adapts itself into the atmosphere which helps interacting and protecting the environment. Due to which this project is environment friendly. The data is monitored in real time which helps to monitor changes and act accordingly. The analysis of the data can also help us predict the outcome of the next specimen.

REFERENCES

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