SMART WATER QUALITY CHECKER

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ABSTRACT:

One of the major elements that influences the ecosystem of the lives on the earth is water. Nowadays it is polluted heavily due to rapid growth in industrialization, human waste and usage of pesticide and fertilizers in agriculture. It leads to heavy water contamination. Due to this we need to observe the water quality in large water bodies like lakes, rivers etc. Currently the internet of things (IOT) are various sensing techniques are used to sense and to analysis the collected data. These techniques are used to check the various water parameters. IOT is connected through WIFI to transmit the messages in Android. As we all know that our earth has various climatic conditions based upon that various climatic and atmospheric conditions the water which we drink also varies from region to region also the soil of that geographical area also impacts the quality of the drinking water. The old and actual method of the quality of the water is to collect the water and soil samples and to send those sample to the laboratories to test the TURBIDITY & PH of the samples. But it is difficult and also a time-consuming process to send the samples each and every time and to get tested. To make this process easy we develop our project to test the TURBIDITY & PH values. As we are mainly focusing on the rural people where the technology is not reached at. Our project is highly beneficial to them as we are developing it in very low cost. With the help of this project, we can easily measure the TURBIDITY & PH of the water easily so that we can prevent the harm. Also, we can use this project to test the values of TURBIDITY & PH in gram level panchayat Municiple water supplying tanks.

KEYWORDS: Turbidity,Ph,water quality,water parameters,internet of things(IOT),WIFI,cloud,industrilization,technologies.

INTRODUCTION:

In present times water monitoring systems goes through a lot of challenges because due to the rapid growth of the global warming and the industrilization.So there is a great need to improvise a best methodology to monitor the water quality.Generally water quality is affected due to 2 types of pollution. Dangerous chemicals which are produced through the industrialization, globalization, urbanization, agriculture are mixed into the safe drinking water.Poor and unhealthy water spreads diseases can also causes death.Five million casualties are occuring due to water-borne diseases in the world.The definition or the meaning of the Water quality monitoring is the collection of data at prefered locations and at regular intervals of time in order to define current quality of the water.This proposed System consists of various sensors which can evaluate the standard values of water in real-time. The water quality parameters like pH which generally measures the concentration of the hydrogen ions present in the water. It also shows whether the water condition is acidic or alkaline. Ph value of pure water is 7,Ph value less than 7 is acidic& more than 7 is alkaline. The range of pH ranges from 0-14 pH.The another main quality attribute of the water is Turbidity which measures the large number of suspended particles in the water which are invisible to us. If turbidity is high then there are higher chances of diarrhea, collera.Whereas if the turbidity is low then the water is safe to drink.The aim of this paper is to measure the water parameters like ph, turbidity, alkalinity, temperature etc..,and pass this information through wifi modules into the android application.Based upon the soil of the earth water may change from place to place to calculate the result of TURBIDITY & PH everytime we need to send the sample to the lab to get tested it becomes more time consuming and difficult to do.

To get the real time values directly to our system or mobile phone we are developing our project with the help of different sensors like WEMO Board,PH sensor,LDR sensor.These are the sensors which we are going to use in our project.We are using the WEMO Board along with Arduino and GPRS module and also we are taking IOT in our project to check the real time values in our system or mobile with the help of APK.With the help of this APK we can easily access the calculated results in our mobile phone.we all know that many people who are mainly living in rural areas are unaware of the harmful diseases with are caused by consuming high acidity and turbidity water also a lot of people are losing their lives because of this unawareness so with the help of our project we can create the awareness in the people also we can help them in drinking quality water.This is our short introduction regarding our project.

Parameters monitored	Quality Range	Units
Turbidity	5-10	NTU
pH	6.5-8.5	pH
Conductivity	300-800	microS/cm

Table 1-According to WHO standards ideal water ranges

LITERATURE SURVEY:

Different types of water quality parameters are measured using sensors by immersing the sensors in different types of water solutions.Generated data is compared with the standard values which is stored in the cloud and if the values exceeds the standard values then a msg will be sent to the mobile phones.Also the discusses about the recent works that are carried out in smart water quality monitoring[1].Real time water quality management systems are evolving all over the world in the recent times.The general water quality parameters are discussed in this paper some of the parameters are as follows: chlorine, organic carbon, conductivity, ph, turbidity. Data Collection Subsystem,Data Transmission Subsystem&Data Management Subsystem[2].This paper discusses about the water quality monitoring system which uses IOT,zigbee and cloud computing techniques to calculate the water quality zigbee is used for communication between the data and the user [3].This paper discusses about the water quality monitoring system which monitors the water the whole day with the help of a single microcontroller.Aso it is made as a low cost project also it reduces the manpower required to measure the water quality [4].This paper discusses about the previous water quality monitoring systems such as Auto monitoring of water quality using GSM, water quality monitoring using image processing, fitting zigbee in the systems for communication.This paper proposed the condition of the water with various sensors using WSN through microcontroller and WIFI[5].From this we researched about how the microcontroller is interacting with the sesors and how the calculated results of the water are transferring to the cloud based platform to evalauate the final outcome of the project[6]. From this paper we gather the information about how the usage of chemical fertilizers in agriculture is affecting the quality of the water which is present in the underground also the continuous water quality checking in the fiji islands also discussed in this paper[7].This paper discusses about how the rapid growth in industrilization is making the drinking water harmful also it discusses about the apporach how we can prevent this pollution effitive water quality testing methods also were discussed [8]In this paper, the methodologies in which the testing is done when the board is swithced on and it shows the values when the board is switched off aslo it measures the various parameters such as temperature overall organic precentage etc..[9].This paper discusses about the water quality of the marine live and it also discusses about the benificial methodologies about developing good water quality generating systems.[10].

Earlier many researchers develops various methods to check the quality of the water and also to test the TURBIDITY & PH values of the water.But all that projects are very complex to understand in regards to the people who lives in rural areas.Also some of the projects also comes with a high price tag Eventhough all this projects were developed to check the water quality but none of them concentrates in the areas like rural areas.In some regions on our earth water is contaminated by harmful Chemicals,Pesticides and toxicity the main reason for this is the growth of industrilization.Due to this rapid growth of the industrilization the lakes and the rivers also getting contaminated with this type of harmful chemicals and pesticides.This contaminated water not only harms the individuals who drink them.But it can also destroy the agricultural lands in the country.Most of the water segregated by gram panchayats is from this type of rivers so there is a high chances of getting illness to the people who drinks them.So that we are making our project to aviod this type illnesses and to caution the people about the water by checking its values.

METHODOLOGY:

WORKING PRINCIPLE:

The water quality system which monitors the quality of the water has the sensors such as PH, temperature, Conductivity and turbidity to get the water parameters. These sensors are placed into the water to analyze the quality of the water This collected data is further used to detect the quality of the water. These analyzed data is further transmitted to the microcontroller which is present in the Arduino module and transmitted through GSM/WIFI module using the data communication module. The data which is collected is processed, transmitted and analyzed. These collected data is displayed in real time to the users who are connected to the WIFI module. The microcontroller in the Arduino is supported with embedded trace & emulation and it is happening in real time. High speed flash memory is also supported in embedded system. Hence the size or the space is considered as an important requirement to scale applications and to control the access which is provided for the users it is safe to use and it also run with less power.

It also provides the low-resolution images along with high processing power. According to International Journal of Pure and Applied Mathematics providing the protocol modifiers for communication in soft modems & in communications and providing paths with large buffer size [11]. The Wi-Fi or GSM module used is low cost with chips in it. The TCP/IP protocol stack and the microcontrollers are manufactured. This approach is discussed in this journal [12]. After this the data is evaluated with the standard WHO standard water quality parameters and if the values are exceeded beyond the WHO standards then the final results are passed through the WIFI modules to the end user.
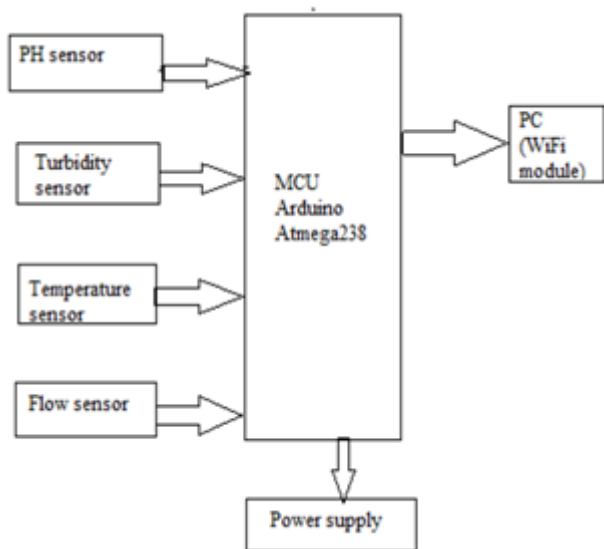
Fig 1.1- Methodology diagram

This project working or the Methodology of our project is as follows: It analyses the water sustainability by measuring the following parameters such as Potential Hydrogen (PH), Turbidity. With the help of WEMO board and the sensors which are connected to it such as PH sensor used to calculated the Potential Hydrogen levels in the water and also the WEMO board is connected with the Turbidity sensor to measure the Turbidity of the water. Here we are using WEMO board to connect the sensors. After calculating the Ph and Turbidity values this whole setup is connected to IOT with the help of WEMO board. And also, the working of the WEMO board is similar to that of Arduino UNO it is a combination of both Arduino and WIFI module. Here we are using 7v power supply for this process. And finally, the values are calculated and they can be transferred to the villagers through SMS with the help of IOT and also with the help of WEMO board.
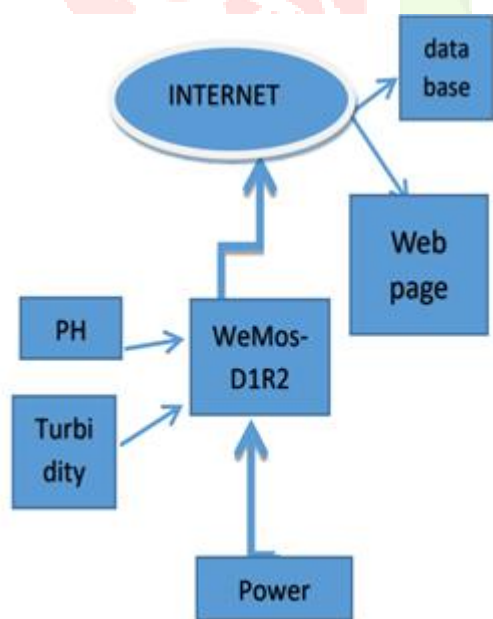
BLOCK DIAGRAM:

Fig 1.2-Block Diagram

HARDWARE TOOLS:

WEMO BOARD:

The working principle of WEMO board is similar to that of Arduino UNO. It consists of 12 input pins (in that 11 Digital pins and 1 analog input pin). The operating voltage of WEMO board is 3.3v. Switching power supply varies from 9v to 12v. WIFI Module is self-integrated with SOC with integrated TCP/IP it can give any microcontroller access to the WIFI network. The WIFI module is capable of hosting an application. Each module comes with pre-programmed AT command set firmware. The module is an extremely cost-effective board with a huge, and growing, community.

Fig 1.3-WEMO Board

PH SENSOR:

Potential Hydrogen (PH) sensor plays a very important role in calculating the quality of the water and also it measures the acidity of the water and normally it scales the values form 1-14. So, if the value is less than 7 then it is acidic in nature. If the value is more than 7 then it is basic in nature, if the value is equal to 7 then it is neutral. Initially the PH value is calculated in terms of voltage, then the voltage is converted into PH value and numbered from 1-14 by using the formula.

Fig 1.4-PH Sensor

TURBIDITY SENSOR:

Turbidity is mainly used to measure the dirtiness and cloudiness of the water the main components that causes the dirtiness in the water is the presence of mud and plankton like algae and fungi presence in water. All this dirtiness is caused due to the storage of water for a long time. In Municiple tanks most of the cases this situation occurs (i.e., storage of water for a long time). This sensor measures the turbidity in the form of units called NTU (i.e., Nephelometric Turbidity Units). When the NTU<1 then it is good for health. Also, if the NTU is 1-5 then it is not a problem to drink that water. But if the NTU>5 then it is harmful to drink that water. Turbidity is nothing but the cloudiness or haziness of water which is produced by a large number of independent particles that are generally not visible to our naked eye, it is similar to that of smoke in air. Turbidity plays a vital role in measuring the quality of the water. The light beam that is scattered due to the suspended particles in the water is measured with the help of turbidity sensor. When the suspended particles in the water increases then the turbidity also increases. Turbidity sensor is also used to measure the standards of the water in rivers, lakes and streams.
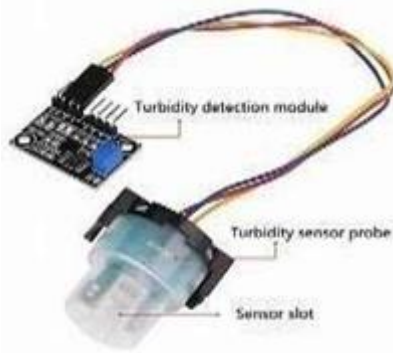
Fig 1.5-TURBIDITY Sensor

EXPERIMENTAL RESULTS:

After making the connections with the Ph and Turbidity sensors along with WEMO board the calculated results will be displayed on the screen and the results can be transferred to the users through notifications with the help of WEMO board. We had identified a suitable implementation model that consists of different sensor devices and other modules, their functionalities are shown in figure. In this model we used ATMEGA 328 with Wi-Fi module. ADC and Wi-Fi modules are connected to the embedded device with connects with the internet. These Sensors are connected to Arduino UNO for monitoring the collected data, ADC will convert the readings to its digital value and from that values the corresponding parameters can be evaluated. After evaluating the data from the different sensors, which are placed in particular area of interest. The sensed data will be automatically sent to the mobiles through WIFI module, Then the results will be established. The results are as follows:
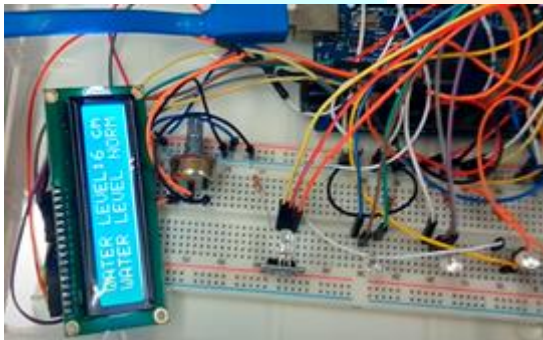

Fig 1.6-PH sensor results

Fig 1.7-TURBIDITY sensor results

LIMITATIONS&FUTURE SCOPE:

Limitations:
1.System hardware need to be handled with care.
2.Only limited users are added to handle the system
Future Scope:
1.In future we can implement IOT in this project.
2.Detecting the more parameters for most secure purpose.
3.Increase the parameters by addition of multiple sensors.
4.By interfacing relay we control the supply of water

CONCLUSION:

The Aim of this project is to detect the PH & TURBIDITY levels present in the water and to report it to the nearby community officials to remove the toxicity in the water. This project fulfills all the conditions that is related to this project. This project demo was implemented in the nearby local areas. Turbidity, PH & Temperature of Water can be detected with the sensors with unique approaches and with existing GSM network. This methodology can monitor the water quality automatically, also it is low cost and low maintenance. This methodology can be expanded to monitor the hydrologic, air pollution, industrial and agricultural productions. To implement type of sensor devices in the environment to collect the data and analysis the water parameters is most useful method. We can bring the environment into real life i.e.; it can interact with other objects through the GSM networks. Then the collected data will be analyzed and the results will be made available to the end user through the Wi-Fi.

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