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Low Cost Water Quality Monitoring System Using IOT

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Abstract: *The monitoring of the water standard is a complex process as it has several laboratories testing methods and time-consuming. To overcome this difficulty, a real time monitoring of water goodness by using IoT has been proposed. Internet of things together with the Sensor water meters for the effectiveness, govern the quality of water. Here we are executing, system for monitoring the water goodness through different sensors turbidity, pH, temperature, conductivity. The controller accesses the information which is monitored by the use of sensors. The accessed data is controlled by the usage of Arduino controller. By using an IoT, the information is collected and the water pollution can be enquired, by a strict mechanism. To the addition, this system states an alert to the publican concerned subdivision or unit about the water. The atmosphere can have adaptable good water.*

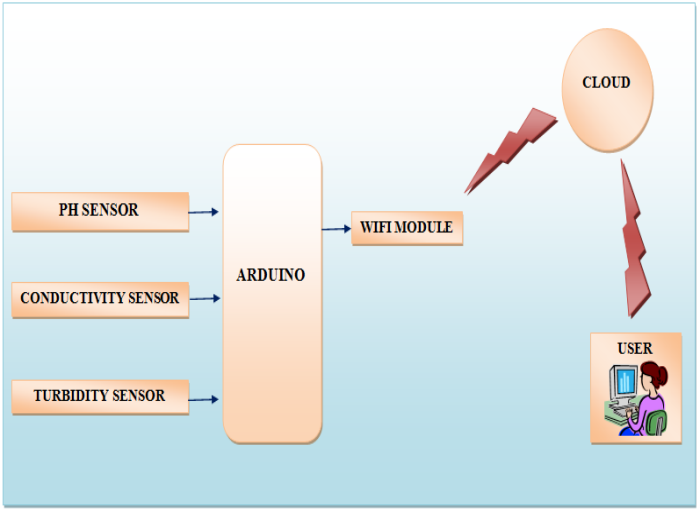
Key Words: Ph sensor, Turbidity sensor, Conductivity sensor, Arduino, Wifi module.

1. INTRODUCTION

Here can be no life without water. Human beings depend heavily on water for survival. They, for example, do not eat food for several days, but cannot survive without drinking water. Today, 1.1 billion people lack access to an improved water resource and over three million people, mostly children, die annually from water-related diseases (UNICEF, 2015). It is perfectly clear that water quality has tremendous effects on human health both in the short term and in the long-term. Unsanitary water, especially contaminated and unboiled water containing a number of viruses and harmful germs can be detrimental to human health. Drinking contaminated water, in medical term, may cause water-related diseases including diarrhoea, bacterial dysentery, cholera, typhoid and many other contagious illnesses. Cholera, watery disease and one of the Cambodia's top killers can kill people in days, or even hours if they are not treated in a timely manner. There were 128 watery disease deaths between mid November in 2009 and mid February in 2010 thank to not using clean water (Seiff & Chhorn, February 2010). River, lake, pond and well water which consists of harmful substances cause people to have a diarrhoea and stomach ache. This always happens in the countryside or in the areas where poor people have no access to safe drinking water and are oblivious of the drawbacks of unsafe water. So we need for better methodologies to monitor the water quality, and here in this project using Internet of Things (IOT) and remote sensing (RS) techniques are being used in different areas of research. We are going to present the design and development of a low cost system for real time monitoring of water quality in an IOT based.

2. PROPOSED WORK

The monitoring of the water standard is a complex process as it has several laboratories testing methods and time-consuming. To overcome this difficulty, a real time monitoring



of water goodness by using IoT has been proposed. Internet of things together with the Sensor water meters for the effectiveness, govern the quality of water. Here we are executing, system for monitoring the water goodness through different sensors-turbidity, pH, temperature, conductivity. The controller accesses the information which is monitored by the use of sensors. The accessed data is controlled by the usage of Arduino controller. By using an IoT, the information

is collected and the water pollution can be enquired, by a strict mechanism. To the addition, this system states an alert to the publican concerned subdivision or unit about the water. The atmosphere can have adaptable good water.

3.SENSORS

3.1 TURBIDITY SENSOR

Turbidity is the cloudiness or haziness of a fluid which is produced by a numerous independent particle that are generally invisible to the visible eye, like smoke in air. Turbidity is the main method to measure the quality of water. The light that is scattered due to the suspended solids in water is measured by the help of turbidity sensor. When

the amount of total suspended solids (TSS) in water increases simultaneously the water' turbidity level (and cloudiness or haziness) also increases. To monitor the turbidity level of water, turbidity sensor is preferred. The gravity turbidity sensor is preferred to identify the water standard by measuring the states of turbidity. The sensor uses light to detect suspended particles in water by calibrating the light transmittance and scattering rate and it changes with the quality of total suspended solids (TSS) in water. when the unwanted particle in water increases then turbidity value also increases. Turbidity sensor is used in measuring the standard of the water in rivers and streams, wastewater and the efficient measurements, managing instrumentation for settling ponds, sediment transportation research are also in the laboratory measurements. The analogues and digitized signals result modes are given by the liquid sensor. The threshold signal is adjustable when it is in digitized signal mode.

3.2 CONDUCTIVITY SENSOR

The salts in water breaks into positive and negative ions when it is dissolved. The transmitters in the water are the dissolved in it and the electrical current is conducted by the conductivity. The calcium, sodium, potassium and magnesium are the major positively charged ions, and bicarbonate, sulfate, chloride, carbonate, are the major negatively charged ions. The minor charged ions are phosphates and nitrates for the conductivity. With help of a probe the electrical conductivity is standardized. The pair of metal electrodes, in the probe which is spaced 1 80 cm apart (unit: milli or micro-Siemens per cm). The electrodes have

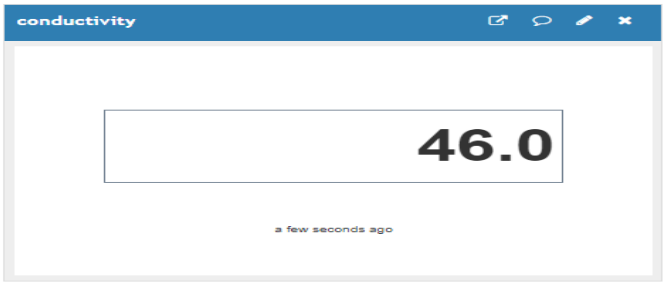
the constant volts. The electrical conductivity is measured by the concentration of dissolved ions which are proportional to the current flow. The dissolved salts concentration is directly proportional to electrical conductivity. The amount of minerals and salts that reside within the water is resulted by the total dissolved solid (TDS). By multiplying the conductivity by a factor of 0.67 B the TDS of water can be determined.

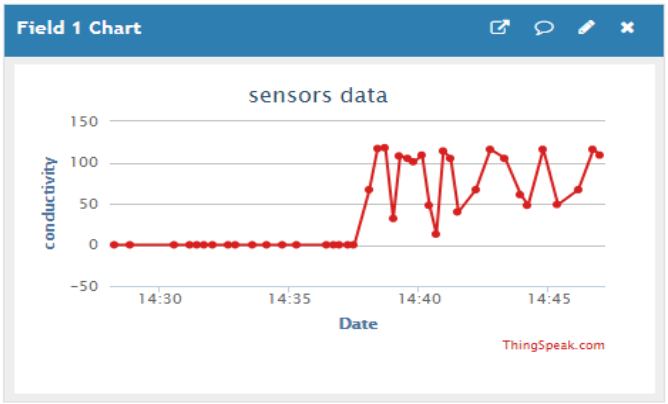
3.3PH SENSOR

It measures the acidic & basic alkaline in the water. It can be defined by using the hydrogen ion concentration with negative logarithmic. The pH scale range is from 0 to 14, it is logarithmic. The concentration of hydrogen ion values are translated using Ph. The hydrogen ion concentration is small for acidic and if it shows high it is for alkaline solutions. The PH around 7 is the natural source water. The water becomes less acidic as the concentration of hydrogen ion decreases for ten-fold for the increases in the number of PH. A reference electrode & a measuring electrodes are enclosed in the pH sensor. The measuring electrode is connected to the positive end of the battery where the reference electrode is connected to the negative terminal. When the pH sensor is immersed in the solution, the reference electrode has its fixed potential. The change in the hydrogen ion concentration does not change the reference electrode. A potential is developed when hydrogen ion concentration is related to the hydrogen ions which are sensitive to the measuring electrodes. The temperature sensor is necessary to correct any variations in the voltage, as the electrodes differential voltage changes with the temperature.

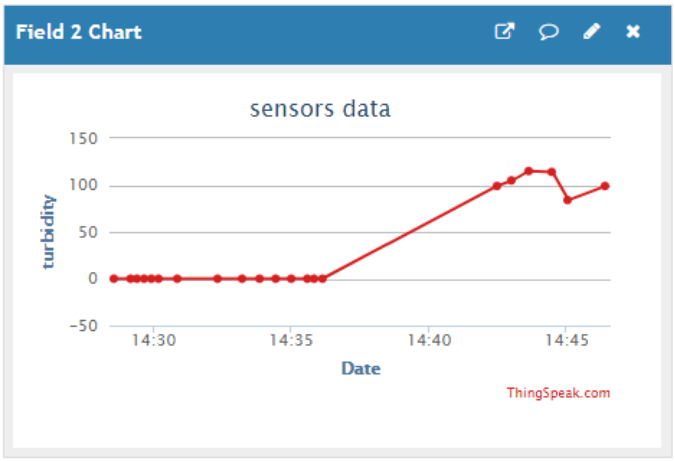
RESULT :

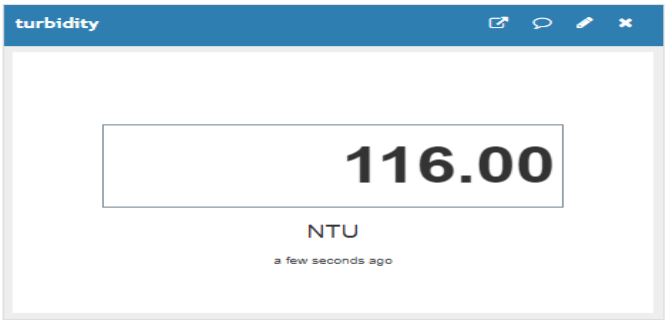
After checking various types of water samples, we may get following types of results, some examples of results of water quality are shown below.





[Note*: result may change in accordance to the sample of water taken]





4. FUTURE SCOPE

1. It can be adopted in real time monitoring of water quality in reservoirs, rivers and other water sources.

2. It can also be used as a product to predict the purity of water for further water treatment in purification of water in chemical industries.

3. It can also be deployed for industry waste to ensure that certain percentage of water to be recycled.

4. It can also be used as a device to measure water parameters in water purifier plants.

4. CONCLUSION

The real time water quality monitoring system for real time applications which is efficient and low cost, has been tested after the implementation. The level of pollutions in the water bodies are governed and the sudden warnings are send to the public through messages and alarm. The diseases that are caused due to the presence of

metals and pollutants in the water can be protected by this system. The severe level of pollutants in the Ganges and Yamuna rivers can be taken immediate actions. The task of monitoring can be done by using the less trained individuals. The installation of the system can be done easily when it is near the target area. Internet of Things (IoT) and its services are has become a part of our everyday life, ways of working, and business. The research is going on, in developing crucial building blocks and models for the next generation. Internet services are supported by a plethora of connected things and with the help of efficient and intelligent mobile network usage IoT has revolutionized the world. IoT is changing the future of technologies and how objects behave around us. Hence we can access any kind of information and command objects at the touch of fingertips

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