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Internet of Things: Water Quality Monitoring

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Abstract: *Nowadays drinking water is the most precious and valuable for all the human beings, drinking water utilities faces new challenges in real-time operation. This challenge occurred because of limited water resources growing population, aging infrastructure etc. Hence therefore there is a need of better methodologies for monitoring the water quality. In order to ensure the safe supply of drinking water quality need. So need to monitoring the water should be drink every person in the earth For the implementation just for sensors is a simulation and rest will be real time arduino with cloud access.*

Key sets: IOT, Water, Sensors, arduino, Cloud.

1. INTRODUCTION

In order to ensure the safe supply of the drinking water quality needs to be monitor in real time. Here, we present a design and development of a low cost system for real time monitoring of the water quality in IOT (internet of things). The system consist of several sensors is used to measuring physical and chemical parameters of the water. The parameters such as temperature, PH, turbidity, conductivity of the water can be measured. The measured values from the sensors can be processed by the core controller. The arduino model can be used as a core controller. Finally, the sensors data can be viewed on internet. By focusing on the above issues we have developed a low cost system for real time monitoring of the water quality in IOT environment. In our design Arduino is used as a core controller. The design system applies a specialized IOT module for accessing sensor data from core controller to the cloud. The sensor data can be viewed on the cloud using a special IP address. Additionally the IOT module also uses an SMTP protocol for viewing the data on mobile.

2. OBJECTIVES

- It minimize the time required for testing the quality of water.
- This system removes need of laboratory testing.
- Test results are recorded in cloud so that any previous data of testing can be fetched.
- Monitoring of water in done online and its analysis can be done in seconds.
- It reduces a lot of time consumed and also manual labour involved in the laboratory Testing of water.
- Results are sent to the mobile so that required action on distribution of water can be Taken by the operator.
- If necessary action is not taken in the given time the factory detail will uploaded a Social media website so that the common people will be aware of the crime.

3. LITERATURE SURVEY

A survey on existing system Traditional methods of water quality involve the manual collection of water sample at different locations, followed by laboratory analytical techniques in order the character the water quality. Such approaches take longer time and no longer to be considered efficient. Although the current methodologies analysis the physical, chemical and biological agents, it has several drawbacks: a) poor spatiotemporal coverage b) it is labour intensive and high cost (labour, operation; and equipment) c)the lack of real time water quality information to enable critical decisions for public health protection. Therefore, there is a need for continuous online water quality monitoring. In-pipe water quality monitoring in water supply systems under steady and unsteady state own conditions: A quantitative assessment." paper presented by A. Aisopou, I. Stoianov, and N. Graham This paper is all about manual testing of water owing through the pipes From the above paper we learnt about the traditional ways of testing water which involves a lot labour and cost and even time.

By focusing on the above issues we have developed a low cost system for real time monitoring of the water quality in IOT environment. In our design Arduino is used as a core controller. The design system applies a specialized IOT module for accessing sensor data from core controller to the cloud. The sensor data can be viewed on the cloud using a special IP address. Additionally the IOT module also uses an SMTP protocol for viewing the data on mobile.

[1]. A low-cost system for real time monitoring and assessment of potable water quality at consumer sites" paper presented by T. P. Lambrou, C, G. Panayiotou, and C. C. Anastasiou This paper says how water can be monitored in real time. From this we got an idea of how the water quality can be monitored in real time, also how using internet the results of the tested water could be viewed and further actions could be taken up.

[2]. Solid-state sensors monitoring parameters of water quality for the next generation of wireless sensor networks." paper presented by S. Zhuiykov. This paper gives information about using sensors to test the quality of water. From the above paper we got to know that we could use sensors to test the quality of water which were digital signals. We use a microcontroller to get analogue output value which could be fed into the Arduino later.

[3]. A Portable Sensor With Disposable Electrodes for Water Bacterial Quality Assessment." paper presented by Marco Grossi, Roberto Lazzarini, Massimo Lanzoni, Anna Pompei, Diego Matteuzzi, and Bruno Ricco. Based on impedance measurements, this paper presents a portable sensor implemented as an electronic embedded system featuring disposable measurement cells, which is suitable of measuring bacterial concentration in water samples. From the above paper we got to know that different sensors available in the market could be used to test different parameters of the water quality. Our testing of water quality involves parameters like temperature, ph, conductivity and turbidity.

[4]. What is the Internet of Things: An Economics Perspective, Auto ID Labs White paper presented by E.Fleisch. This paper is targeted towards students, practitioners and researchers who are interested in understanding and contributing to the ongoing merge of the physical world of things and the Internet. From the above paper we learnt that the sensors and physical elements like water could be combined with internet for its testing. This reduces a lot of manual work involved in traditional system of water testing.

[5]. The Five Characteristics of Cloud Manufacturing Things “paper presented by M.Spinola. This paper is about the essential things on cloud computing we need to be aware of before using cloud computing. From the above paper we learnt that using cloud would be better than using the local server as the storage space in could is vast and data could be fetched from cloud whenever necessary From the above paper we learnt that the sensors and physical elements like water could be combined with internet for its testing.

4. TOOLS

[1]. TEMPERATURE IN WATER QUALITY MONITORING

Temperature is a critical water quality and environmental parameter. It governs the kinds and types of aquatic life. Regulates the maximum dissolved oxygen concentration of the water. In quinces the rate of chemical and biological reaction.

2]. SALINITY IN WATER QUALITY MONITORING

Salinity is a measure of the content of salts in soil or water. Salts are highly soluble in surface and groundwater and can be transported with water movement. Large salt deposits are a stored deep in soils or as surface salt deposits and salt lakes. This natural distribution of salt in the landscape is referred to as 'primary salinity'. In normal circumstances, the deep roots of native plants absorb most water entering the soil before it reaches the salt contained in groundwater below the plant root zone. However, widespread vegetation clearance, poor land use, irrigation and industrial practices have made it easier for salt to be transported to the soil surface or to waterways. The additional salt from these altered land use and management practices is referred to as 'secondary salinity „Excessive amounts of dissolved salt in water can select agriculture, drinking water supplies and ecosystem health.

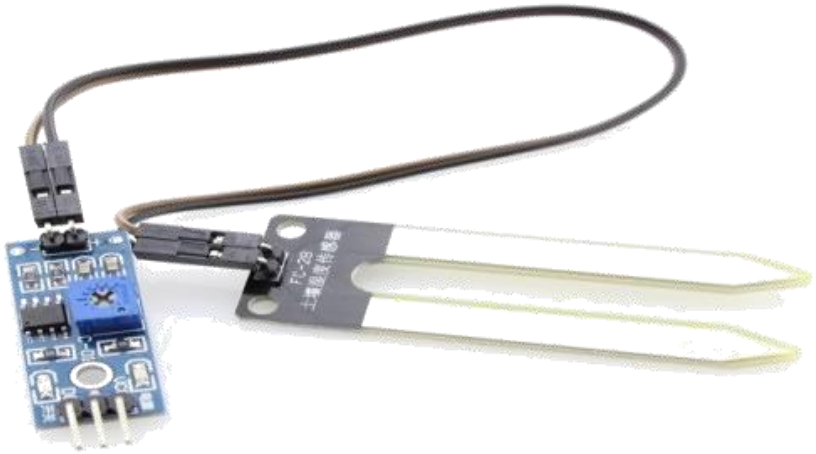


Fig 1: Salinity Sensor

[3]. TURBIDITY IN WATER QUALITY MONITORING

Turbidity is the amount of cloudiness in the water. This can vary from a river full of mud and split where it would be possible to see through the water(high turbidity) to spring water which appear to be completely clear(low turbidity). Turbidity can be caused by: Slit, Sand and other. Bacteria and other germs. Chemical precipitates.

Fig 2: Turbidity Sensor

[4]. PH IN WATER QUALITY MONITORING

PH indicates the sample's acidity but is actually a measurement of the potential activity of hydrogen ions (H+) in the sample. Solutions with a pH below 7.0 are considered acids, Solutions with a pH above 7.0, up to 14.0 are considered bases. The pH of water determines the solubility and biological availability of chemical constituents such as nutrients (phosphorus, nitrogen, and carbon) and heavy metals. There are many factors that affect the Ph of water like, the bedrock and soil composition through which the water moves. Amount pH plant growth and organic material in water body. Dumping of chemicals by individuals, industries and communities. Amount of acid precipitation. Lastly stems from coal mine drain

Fig 3: PH Sensor

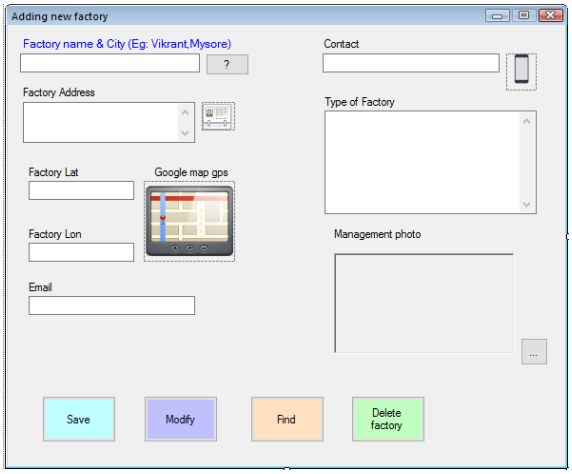
[5]. ARDUNIO FOR COMMUNICATION

Arduino is a series of credit card-sized single board computers. We have used Arduino for communication as it is efficient in cloud computing. It supports full edged operating system. It has several pins which facilities us to connect sensors and other devices to make computation easy. Arduino Allows to embedded with hardware device. Arduino is low cost. Arduino quad core with 1GB RAM. An Arduino is a microcontroller motherboard. A microcontroller is a simple computer that can run one program at a time, over and over again. It is very easy to use.

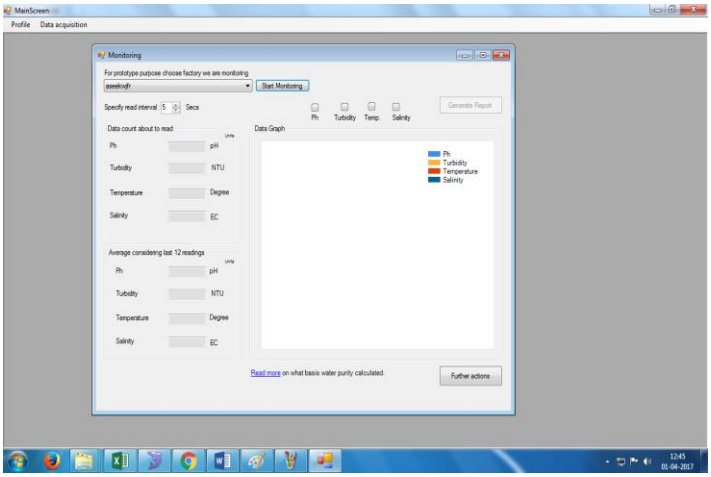
A Raspberry Pi is a general-purpose computer, usually with a Linux operating system, and the ability to run multiple programs. It is more complicated to use than an Arduino An Arduino board is best used for simple repetitive tasks: opening and closing a garage door, reading the outside temperature and reporting it to Twitter, driving a simple robot. Raspberry Pi is best used when you need a full-fledged computer: driving a more complicated robot, performing multiple tasks, doing intense calculations (as for Bitcoin or encryption). Anywhere in the document, if referred as Arduino/ Raspberry Pi refers to IOT environment, which can be replaced by other based on the users requirements and performance.

Fig 5: Arduino

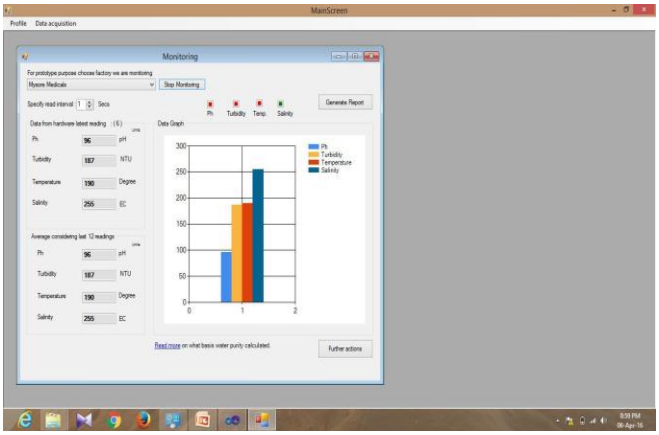
5. RESULT



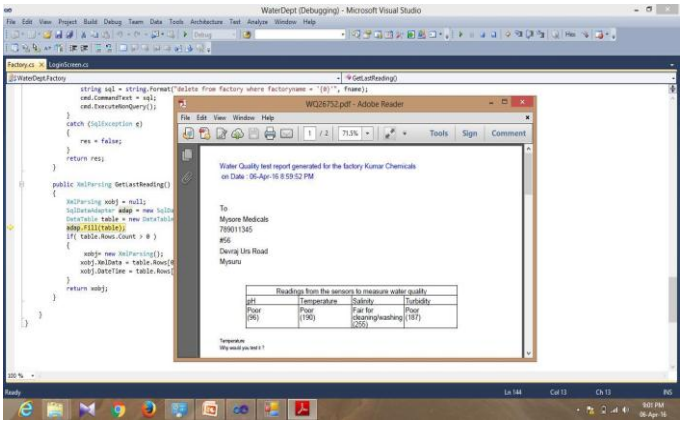
(a) Add Factory Details



(b) Water testing



(c) Water Monitoring



(d) Generating Report

6. CONCLUSION

The above presented project was successful in what it had to achieve. Our main objective was to reduce the time required for testing of water in laboratories, and we have been able to achieve it but with lesser accuracy. It reduces the laboratory equipment that would be required for the traditional way of testing the water for its quality. The major point is we have been able to record all the details obtained in our testing in cloud. The results can be viewed and fetched whenever required. The monitoring of water can be done online easily using this system. Hence, we have tried to achieve all our objectives.

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BIOGRAPHY

Mr. Dhananjaya Kumar K is an Assistant Professor, Department of Computer Science at yuvaraja's college, Karnataka, India. He hold a Master Degree at Computer Science and Engineering from the university of VTU, He has experience on IOT, Hadoop framework and Map-Reduce processes and developed a Big Data and analytics for the needs of his Master Thesis. He has published research paper on Advanced Algorithm and Emergency Management system in elevated toll roads at journals and international conferences and recently published research paper on big data in department of technical education on digital teaching in class room.