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SOLAR BASED ADVANCED WATER QUALITY MONITORING SYSTEM

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Abstract:- ***Water pollution is one of the biggest fears for the green globalization.In order to ensure the safe supply of the drinking water the quality needs to be monitor in real time. In this paper 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, flow sensor of the water can be measured. The measured values from the sensors can be processed by the corecontroller. The Arduino model can be used as a core controller. Finally, the sensor data can be viewed on internet using WI-FI system.***

Keywords:- ***Globalization, safe, supply, water, IOT, sensor, Controller, internet, Wi-fi.***

1. INTRODUCTION

In the 21stcentury, there were lots of inventions, but at the same time were pollutions, global warming and so on are being formed, because of this there is no safe drinking water for the world's pollution. Nowadays, water quality monitoring in real time faces challenges because of global warming limited water resources, growing population, etc. Hence there is need of developing better methodologiesto monitor the water quality parameters in real time[1]. The water quality parameters pH measures the concentration 1108Vaishnavi V. Daigavane and Dr. M.A Gaikwad of hydrogen ions. It shows the water is acidic or alkaline. Pure water has 7pH value, less than 7pH has acidic, more than 7pH has alkaline. The range of pH is 0-14 pH. For drinking purpose it should be 6.5-8.5pH. Turbidity measures the large number of suspended particles in water that is invisible. Higher the turbidity higherthe risk of diarrheoa, collera. Lower the turbidity then the water is clean. Temperature sensor measures how the water is, hot or cold. Flow sensor measures the flow of water through flow sensor. The traditional methods of water quality monitor involves the manual collection of water samples from different locations.

The rest of this paper is organised as follows: section II review the related work of this project, section III describes the proposed system with the modules explanation, section IV provides the Schematic circuit with it working, Section V shows the results and discussion, section VI the conclusion with future scope.

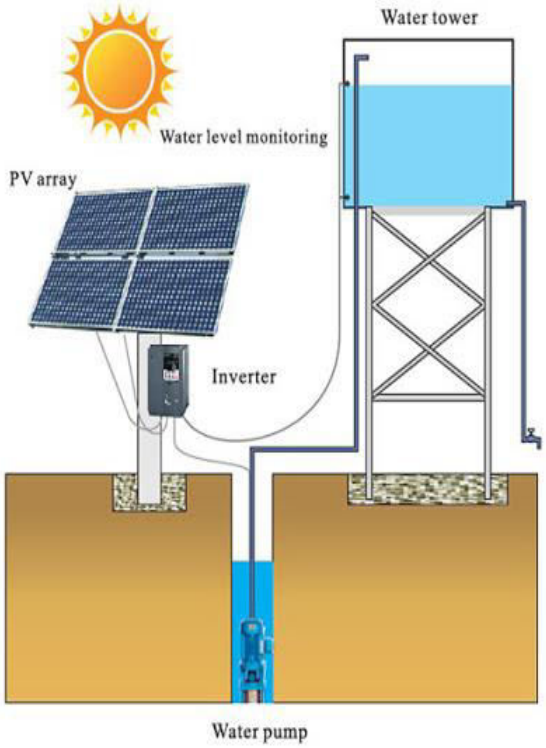

Fig.1 Solar based Water monitoring system.

2. THEORY

Nikhil Kedia entitled "Water Quality Monitoring for Rural Areas-A Sensor Cloud Based Economical Project."Published in 2015 1st International Conference on Next Generation Computing Technologies (NGCT-2015) Dehradun, India. This paper highlights theentire water quality monitoring methods, sensors, embedded design, and information dissipation procedure, role of government, network operator and villagers in ensuring proper information dissipation. It also explores the Sensor Cloud domain. While automatically improving the water quality is not feasible at this point, efficient use of technology and economic practices can help improve water quality and awareness among people.[1]Jayti Bhatt,Jignesh Patoliya entitled "Real Time Water Quality Monitoring System".This paper describes to ensure the safe supply of drinking water the quality should be monitored in real time for that purpose new approach IOT (Internet of Things) based water quality monitoring has been proposed. In this paper, we present the design of IOT based water quality monitoring system that monitor the quality of water in real time. This system consists some sensors which measure the water quality parameter such as pH, turbidity, conductivity, dissolved oxygen, temperature. The measured values from the sensors are processed by microcontroller and this processed values are transmitted remotely to the core controller that is raspberry pi using Zigbee protocol. Finally, sensors data can view on internet browser application using cloud computing.

[2]Michal Lom, Ondrej Pribyl, Miroslav Svitekentitled "Industry 4.0 as a Part of Smart Cities". This paper describes the conjunction of the Smart City Initiative and the concept of Industry 4.0. The term smart city has been a phenomenon of the last years, which is very inflected especially since 2008 when the world was hit by the financial crisis. The main reasons for the emergence of the Smart City Initiative are to create a sustainable model for cities and preserve quality of life of their citizens. The topic of the smart city Water Quality Monitoring System Based on IOT1109cannot be seen only as a technical discipline, but different economic, humanitarian or legal aspects must be involved as well. In the concept of Industry 4.0, the Internet of Things (IoT) shall be used for the development of so–called smart products. Sub-components of the product are equipped with their own intelligence. Added intelligence is used both during the manufacturing of a product as well as during subsequent handling, up to continuous monitoring of the product lifecycle (smart processes). Other important aspects of the Industry 4.0 are Internet of Services (IoS), which includes especially intelligent transport and logistics (smart mobility, smart logistics), as well as Internet of Energy (IoE), which determines how the natural resources are used in proper way(electricity, water, oil, etc.). IoT, IoS, IoP and IoE can be considered as an element that can create a

connection of the Smart City Initiative and Industry 4.0 –Industry 4.0 can be seen as a part of smart cities.

[3]Zhanwei Sun,Chi Harold Li,Chatschik Bisdikian,Joel W.Branch and Bo Yang entitled"QOI-Aware Energy Management in Internet-of-Things Sensory Environments". In this paper an efficient energy management frame work to provide satisfactory QOI experience in IOT sensory environments is studied. Contrary to past efforts, it is transparent and compatible to lower protocols in use, and preserving energy-efficiency in the long run without sacrificing any attained QOI levels. Specifically, the new concept of QOI-aware "sensor-to-task relevancy" to explicitly consider the sensing capabilities offered by an sensor to the IOT sensory environments, and QOI requirements required by a task. A novel concept of the "critical covering set" of any given task in selecting the sensors to service a task over time. Energy management decision is made dynamically at runtime, as the optimum for long-term traffic statistics under the constraint of the service delay. Finally, an extensive case study based on utilizing the sensor networks to perform water level monitoring isgiven to demonstrate the ideas and algorithms proposed in this paper, and a simulation is made to show the performance of the proposed algorithms.

[4]Sokratis Kartakis, Weiren Yu, Reza Akhavan, and Julie A. McCann entitled"Adaptive Edge Analytics for Distributed Networked Control of Water Systems"This paper presents the burst detection and localization scheme that combines lightweight compression and anomaly detection with graph topology analytics for water distribution networks. We show that our approach not only significantly reduces the amount of communications between sensor devices and the back end servers, but also can effectively localize water burst events by using the difference in the arrival times of the vibration variations detected at sensor locations. Our results can save up to 90% communications compared with traditional periodical reporting situations.

3. AIM OF PROJECT

Project consists of two function unit:

1. To design the system which monitors water quality parameter using sensors.

2. To design the system which store the measured parameters and displays those parameters on any device which has internet facility.

4. PROBLEM STATEMENT

Existing water treatment systems cannot detect the dissolved contaminants such as chemicals. Additionally, each laser technology only has limited ability to monitor specific pathogen or virus. Using traditional approaches of monitoring water quality in the water distribution system are not safe. Chlorinating in distribution system is usually used to protect microorganisms. However, drinking too much chlorinated water leads to Cancer and other diseases. Thus, chlorine is considered as another contaminant as well as pathogen and viruses. Moreover, there is no single instrument that can detect all the possible water parameters such as pH, turbidity and conductivity.The laser technology is used to detect the water quality and analyze the collected data but cannot be used for online monitoring. Thus, developing a real-time online monitoring system in water distribution is highly important to prevent the future water-related diseases. Thus with this single instrument can detect all the possible water parameters such as pH, turbidity and conductivity.

5. BLOCK DIAGRAM

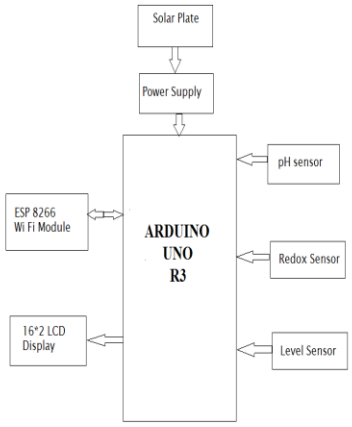

Fig.2 Block diagram of monitoring system

This section explains the complete block diagram of the proposed system. Also, it presents the detail explanation of each and every block.The overall block diagram of the proposed system is as shown in figure 1. This proposed block diagram consist number of devices having respective sensors, and the collected data from all devices are gathered at the core controller Arduino uno via wab server. The device consist several sensors for measuring water quality parameter such as pH, turbidity, conductivity, dissolved oxygen, temperature. The data of sensors are not in a proper manner for sending them directly to the core controller using Internet protocol. So, the microcontroller is introduced in a proposed system for getting data from sensors and processes on them to make compatible for Wi fi module.in section Wifi module has low data rate, low power consumption, more node density that makes it suitable for sensor networking in the proposed system.A Wifi module ESP 8266 is to provide the internet connectivity to controller . it help to collect the data of sensor and send to cloude.in this projects we use MATLAB (Things speek) wab server Coordinator Wi Fi module is connected to the core controller, the core controller manages data coming from different devices. The core controller puts the data in a text file which is transmitted to the IOT module. For transmitting data to the IOT, gateway is created on the raspberry pi using FTP (file transfer protocol) protocol. The brief introduction of IOT gateway is discussed in [12]. In the proposed system, for monitor processed data on the internet cloud computing technology is use which provides the personal local server. In cloud computing, separate IP address is provided which make possible to monitor data from anywhere in the world using the internet. To access that monitor data and make system user-friendly browser application is introduced which work on HTTP. So, by using browser application user can access and monitor the data from all over the word.

5. APPLICATIONS

1. Domestic water is intended for human consumption for drinking and cooking purposes. The Bureau of Indian Standards (Central Ground Water Board, 2017) provides details about acceptable limits of substances such as Aluminum, Ammonia, Iron, Zinc etc. Traditional water quality measurement involves manual collection of water at various locations, storing the samples in centralized location and subjecting the samples to laboratory analytical testing Such approaches are not considered efficient due to the unavailability of real time water quality information, delayed detection of contaminants and not cost effective solution. Hence, the need for continuous online water quality monitoring.
2. Pollution levels in sea: measuring levels of temperature, salinity, oxygen andnitrates give feedback for quality-sensing system in seawater.
3. Chemical leakage detection in revisers: Extreme pH or low DO values -signal chemical spills due to sewage treatment plant or supply pipe problem.

4. The water quality monitoring is important for several applications such as environment monitoring of pond and ecosystem, drinking water distribution and measurement, contamination detection in drinking water.

6. ADVANTAGES

1. This project is more suitable to monitor water quality parameters in real time.
2. To monitor data from various locations IOT environment is provided.
3. No need to visit the location to monitor the water quality parameters.
4. Use of PIC microcontroller reduces the price of system by great extent.
5. Due to real time monitoring the water quality parameters are available whenever required which can indicate any water contamination occurred.

7. Disadvantages

1. Accuracy of the measured value depends on the sensor used.
2. Required internet connection for real time water quality parameters Monitoring.

8. RESULTS

The capability of water quality monitoring system can be enhanced to obtain more efficient reliable results. The number of parameters to be sensed can be increased by the addition of multiple sensors to measure dissolved oxygen (DO), chemical oxygen demand (COD), biochemical oxygen demand (BOD), ammonia nitrogen, nitrate, nitrite, phosphate. The system can be further upgraded using wireless sensor networks. The system can be expanded to monitor hydrologic, air pollution, industrial and agricultural production and so on. It has widespread application and extension value. Work can be carried on to include controlling the supply of water.

9. CONCLUSION

Real time system for water quality measurement based on GSM is presented in this report. The system is incredibly versatile and economical. It is a real-time system that measures numerous parameters pertaining to the water and send them to the monitoring center. The system can monitor water quality automatically, and it is low in cost anddoesn't need individuals on duty.The system has good flexibility. It is a versatile system, because of which simply by replacing the sensors and by making some changes within the computer code, the system can be used to measure some other parameters of water. The system is reliable and easy to maintain and it can be extended to measure water pollution as well. By effectively using the proposed system, one can save time and cost can also be reduced.

13. REFERENCE

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