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Water Quality Monitoring System based on IOT Platform

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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 core controller .The Raspberry Pi can be used as a core controller. Finally, the sensor data can be viewed on internet using cloud computing.*
Keywords: *ATMEGA 328, Ultrasonic sensor, IR sensor, Arduino, IOT , LCD(16*2), Login.*

I. Introduction

Drinking water quality monitoring is very essential before consumption in daily life as it affects directly or indirectly human health (Bhardwaj et al., 2018). The water crisis has become a global problem in recent years, it is not limited to a particular region or country. By the end of 2025, half of the world population will be living in water-stressed areas (World Health Organization (WHO), 1996). In developing countries, as much as 80% of illnesses are linked to poor quality water and 20 sanitation conditions (Anan, 2003). India is one of the most water-challenged countries, among developing countries in the world. A solution in this regard is extremely important and this project focuses on the above mentioned issues catering to all the technical and economic aspects. The project highlights the entire 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.

II. Literature Review

(1) Water Quality Monitoring for Rural Areas- A Sensor Cloud Based Economical Project by Nikhil Kedia in 978-1-4673-6809-4/15/$31.00 ©2015 IEEE.

In this paper author comparing the WSNs with the Sensor-Cloud, arrived at the decision of choosing Sensor-Cloud Infrastructure for high-end deploys. He also gave solution to the security issues based of earlier research papers and finally a fully analysed and tested economic model was given for the project. There is no doubt that this project is feasible in all aspect

(2) Dynamic monitoring based on wsn of IOT by ShaoHua Hu in 978-1-4799-1891-1/15/$31.00 ©2015 IEEE.

In this paper author described The Internet of Things is very important to monitor aquaculture environment. Pre-warningon aquaculture safety is an important measure to ensure quality safety of aquatic products. At present, most pre-warning methods on aquaculture safety are restrained by single factor, e.g., water quality, bacteria, viruses and other single factor.

(3) An IoT based 6LoWPAN enabled Experiment for Water Management by Anjana, Sahana M, Ankith, K Natarajan, K R Shobha,in1570912963©2015 IEEE.

In this paper, they present an IPv6 network connected IoT design for real-time water flow metering and quality monitoring. In this prototype implementation uses CoAP for monitoring and control approach which supports internet based data collection. The system addresses new challenges in the water sector - ease of billing, fair billing and the need for a study of supply versus consumption of water in order to create awareness to curb water wastage and encourage its conservation. Automatic detection of leakage through any of the outlets is notified to the user

III. Motivation

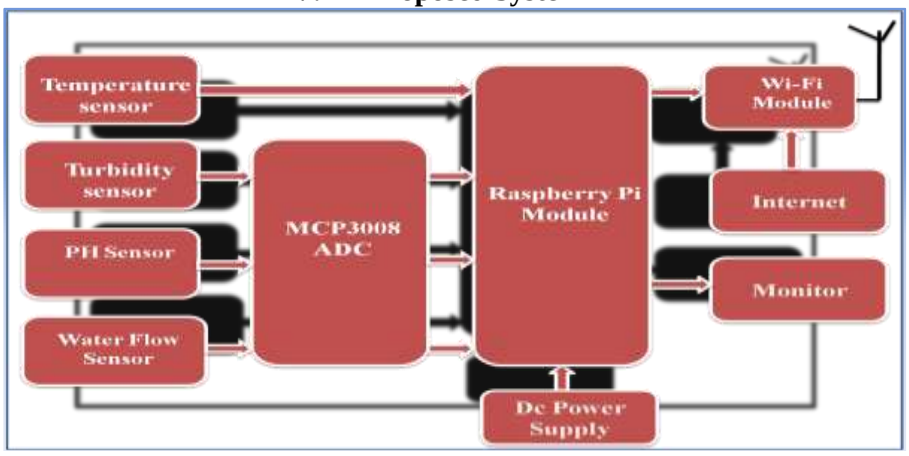
The low cost System for real time monitoring of water quality by measuring Temperature, Turbidity, Ph and water flow pH, commonly used for water measurements, is a measure of acidity and alkalinity, or the caustic and base present in a given solution. It is generally expressed with a numeric scale ranging from 0-14. The value 7 represents neutrality. The numbers on the scale increase with increasing alkalinity, while the numbers on the scale decrease with increasing acidity. Turbidity has indicated the degree at which the water loses its transparency. It is considered as a good measure of the quality of water.

IV. Methodology & Implimentation

Water quality overall is decided on how a variety of characteristics such as turbidly and PH (among others) are measured against federally mandated regulations. Every six years the drinking water standards get more and more lengthy. Drinking water standards are regulations that EPA sets to control the level of contaminants in the nation's drinking water. These standards are part of the Safe Drinking Water Act's "multiple barrier" approach to drinking water protection, which includes assessing and protecting drinking water sources;

*The **Raspberry Pi** is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python. 1.4GHz 64-bit quad-core processor, dual-band wireless LAN, Bluetooth 4.2/BLE, faster Ethernet, and Power-over-Ethernet support (with separate Po E HAT)*

V. Proposed System



In this, we present the theory on real time monitoring of water quality in I O T environment. The overall block diagram of the proposed method is explained. Each and every block of the system is explained in detail. In this proposed block diagram consist of several sensors (temperature, pH, turbidity, flow)

pH sensor:

The pH of a solution is the measure of the acidity or alkalinity of that solution. The pH scale is a logarithmic scale whose range is from 0-14 with a neutral point being 7. Values above 7 indicate a basic or alkaline

solution and values below 7 would indicate an acidic solution. It operates on 5V power supply and it is easy to interface with arduino .The normal range of pH is 6 to 8.5.

Turbidity sensor:

Turbidity is a measure of the cloudiness of water. Turbidity has indicated the degree at which the water loses its transparency. It is considered as a good measure of the quality of water. Turbidity blocks out the light needed by submerged aquatic vegetation. It also can raise surface water temperatures above normal because suspended particles near the surface facilitate the absorption of heat from sunlight.

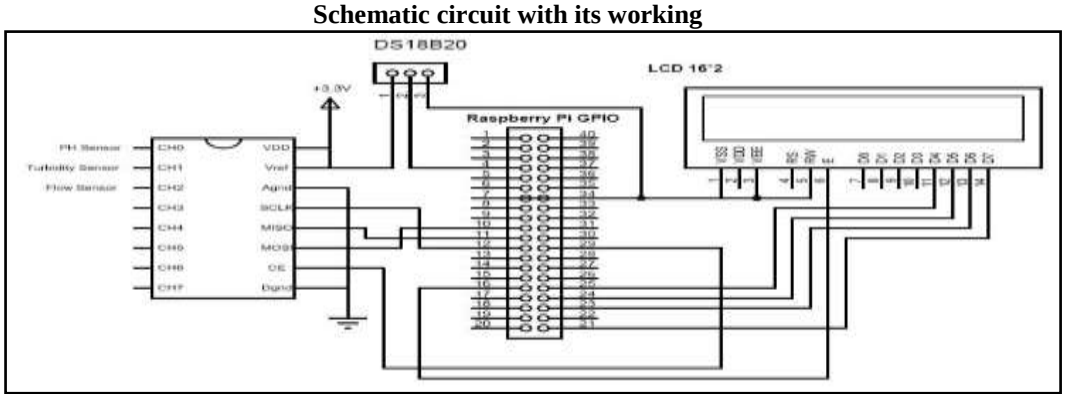
Temperature sensor:

Water Temperature indicates how water is hot or cold. The range of DS18B20 temperature sensor is -55 to +125 °C. This temperature sensor is digital type which gives accurate reading

Flow sensor:

Flow sensor is used to measure the flow of water through the flow sensor. This sensor basically consists of a plastic valve body, a rotor and a Hall Effect sensor. The pinwheel rotor rotates when water / liquid flows through the valve and its speed will be directly proportional to the flow rate

Schematic circuit with its working



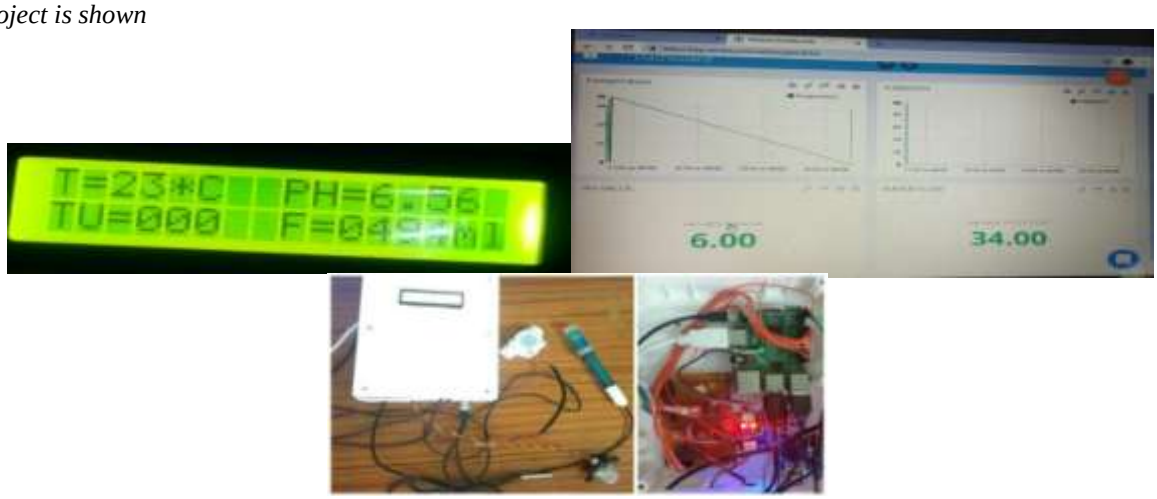
As we know raspberry pi 3B has 40 GPIO pins. The GPIO means general purpose input output. The Raspberry Pi has no built in analogue inputs which means it is a bit of a pain to use many of the available sensors. The MCP3008 is a 10bit 8-channel Analog-to-digital converter (ADC). It is cheap, easy to connect and doesn't require any additional components. It uses the SPI bus protocol which is supported by the Pi's GPIO header. This particular chip makes use of the SPI (Serial Peripheral interface bus) which means it will only require 4 pins and is relatively easy to communicate to thanks to the SPIDev library for python. The CH0->CH7 pins (Pins 1-8) are the analog inputs for the MCP3008. The MCP3008 connects to the Raspberry Pi using a SPI serial connection. You can use either the hardware SPI bus, or any four GPIO pins and software SPI to talk to the MCP3008. Software SPI is a little more flexible since it can work with any pins on the Pi, whereas hardware SPI is slightly faster but less flexible because it only works with specific pins. If you aren't sure which to use I recommend software SPI as it's easier to setup.

VI. Conclusion And Future Enhancemen

Water quality monitoring is essential before consumption and its real-time monitoring will reduce the risk of illness in the human being. This paper reported a smart sensing platform for real-time water quality monitoring and to collect a large database. The designed platform is compatible with IoT networks as the Raspberry Pi used here has a built-in Wi-Fi module and will be implemented in future looks. The work presented here has both academic and practical importance. Currently, the calibration of the sensor is time-consuming and requires a certain time period to get stabilize .

VII. Result

The Water quality monitoring is important not only for the water department, it is low cost system this system can be used by the common people who care about the water, and it is useful to know whether the water is good for drinking etc. Such application need separate methods for water quality management. Setup of project is shown



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