Real Time Analysis of Water Monitoring System Using IOT

R Sireesha, N V V N J Sri Lakshmi, A Sudhakar, S Meghana, V Hemanth, S. Anvesh

Abstract: ***Water quality monitoring is gaining higher importance in the recent communication technology. This proposed design of the paper provides the overview of checking the quality in the real time environment with low cost maintenance. The parameters used in the design will reduce the time consummation for manual check of the samples of the water. The method used in the proposed design consists of several sensors to check the pH level, temperature, Humidity and electroconductivity to have the general check on the quality of water. The data collected from the sensors and ESP8266 microcontroller are sent to the cloud. The cloud stores the data and is visualized in the mobile application through application programming interface (API). The This system is used have the genuine check of the quality of the water and this data can be used for the future in data analytics. The quality of the water is using the Internet of Things technology for improvising the performance in this device.***

Index Terms*: *Water quality parameters, Internet of Things, Cloud computing.

I. INTRODUCTION

Currently the drinking water is the important prized for the humans. Nowadays the water levels are maintained very low and the usage of the water in the lakes are not properly maintained. So, it is very important to analyses the water quality for consuming in the regular life. The development of electronics has triggered to utilize the internet of things technology. The IoT is a connection of devices with a network and serve the purpose of useful for humans. The data from the sensors are collected from the data and this data is processed to store in the cloud/database for the analytics purpose. In this present proposed design, the sensor such as pH, humidity, temperature and electroconductivity are observed and these are measured in the water flow. The collected data is retrieved from the wi-fi based microcontroller. This data serves critical to main the quality of the water. This quality analysis is observed from various samples and the test results are taken as the major proof to improve the water quality.

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II. LITERATURE SURVEY

In the literature survey [1] the author has proposed the Water monitoring system based on the IoT in the real time. This model checks the water level in the dam areas to understand the flood occurrence and these devices are used at the disaster-prone area. In this, the author [2] had used the IoT with smart home and observed the interoperability requirements. In this paper [3] the quality of the water is monitored in the real time and the proposed design is maintained in the low cost. These sensors are used in measuring the physical parameters of the water. In this study, the author [4] had proposed to monitor the level of water at the tanks, rivers, ground water tables, bores etc. The proposed design is used to control the working of the water pump to the residentials manually and automatically on the bases of the water level [5].

III. MOTIVATION

Pollution of the water and the water scarcity is the global faced problem and internationally this problem is also had the future scope of improving the health of the humans. The records and the survey had stated the due to lack of quality in the water more than 13,000 people die around the world and the diseases are also increasing every day [6]. In many countries, the contaminated water is being used for the drinking due to the lack of awareness. So, in this proposed design the water quality is given higher priority to work.

IV. METHODOLOGY

The methodology of the quality testing monitoring system is shown in the Fig.1.

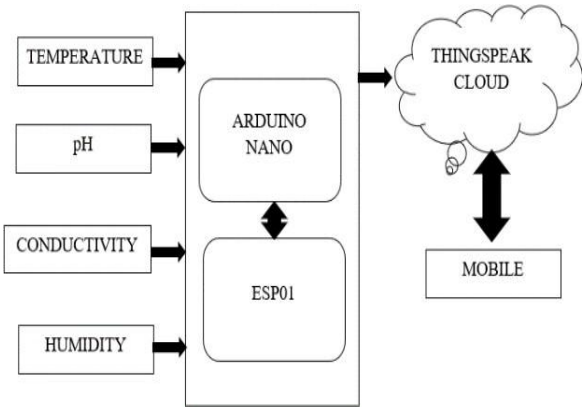

Fig.1. Shows the proposed design

V. PROPOSED DESIGN

The proposed design of the system is based on the parameter to check the quality are considered such as pH value, temperature, humidity and the electroconductivity of the water are tested with the microcontroller Arduino Nano. The sensors are converted into from analog to digital and the microcontroller read the values in the digital form. The data is therefore collected from the microcontroller and sent to the cloud on the connection of Wi-fi based microcontroller ESP-01.

The ESP-01 microcontroller is used by the SPI/I2C communication and the data is transferred from the Arduino Nano. From the Wi-fi microcontroller, the data is sent for the processing to the cloud. The cloud Thingspeak stores the data and further transfers to the mobile user application.

VI. HARDWARE AND SOFTWARE CO-DESIGN

The hardware and software requirements of the proposed design are mentioned in the following sections.

a) pH sensor: The pH meter is used to measure the hydrogen ion present in the water-based solutions and also the acidity and alkalinity are measured are expressed as pH. The sensor is shown in the Fig.2.

Fig.2. pH sensor

b) DHT11 sensor: The DHT11 is used to measure the digital humidity and temperature from the water level area is shown in the Fig.3. By the temperature of the water, the increase and decrease of the harmful substrates are observed.

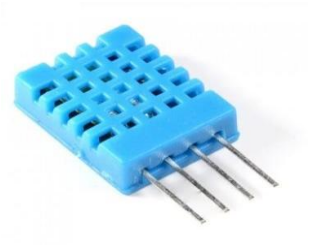

Fig.3 DHT11 sensor

c) Electroconductivity sensor: The sensor measures the conductivity of the water solution. In the many applications such as hydroponics, aquaculture and fresh water systems to understand the nutrients, salts, impurities are observed with the sensor.

d) Arduino Nano: Arduino Nano is a microcontroller based on AT mega 328p.It has 14 digital input/output pins and 6 analog input/output pins. The Arduino microcontroller source code is developed in the software of Arduino IDE by the serial usb, the program is dumped in the microcontroller. The Arduino Nano is shown in the Fig.4.

Fig.4. Arduino Nano

e) Wi-Fi ESP-01: The ESP01 model is a self SOC integrated with the TCP/IP protocol that interfaces the 802.11 b/g/n to access the Wi-Fi network.

The software for the proposed design is the Arduino IDE which is an integrated development environment to implicate the microcontroller boards of Arduino in this board manager. The firmware in the Arduino ATmega16U2 is used to dump the Arduino code in the microcontroller.

The clouds used to send the data is Thing speak. Thing speak is an open source internet of Things application used to store and retrieve the data from the sensors using the HTTP protocol. The dash board used in the things peak can be used to visualize the sensor values by using the Application programming interface keys.

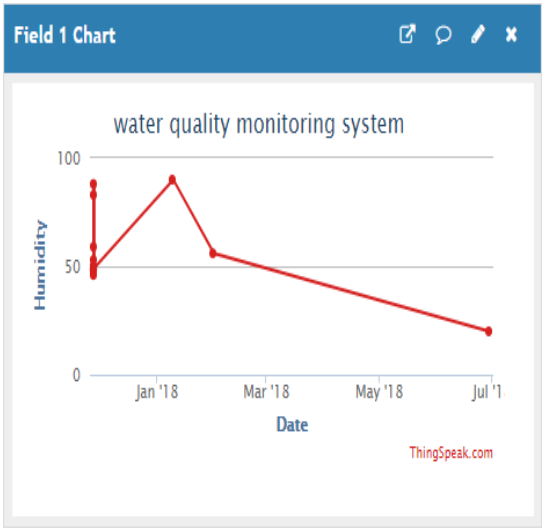

Fig.5. shows the Humidity results

VII. EXPERIMENTAL RESULTS

The experimental results of the water quality monitoring system are shown in the Fig.5,6,7.

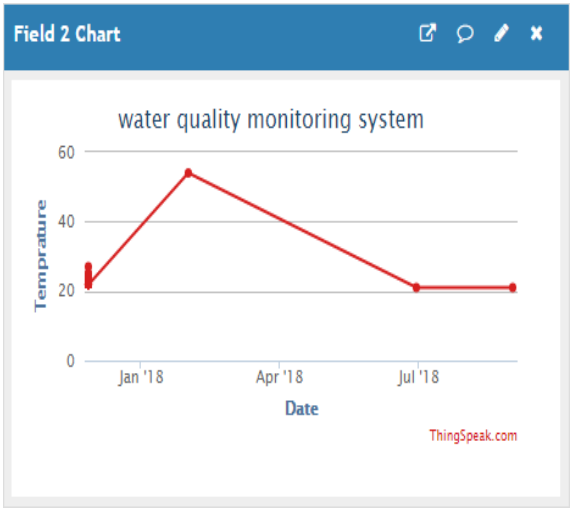

Fig.6. shows the temperature results

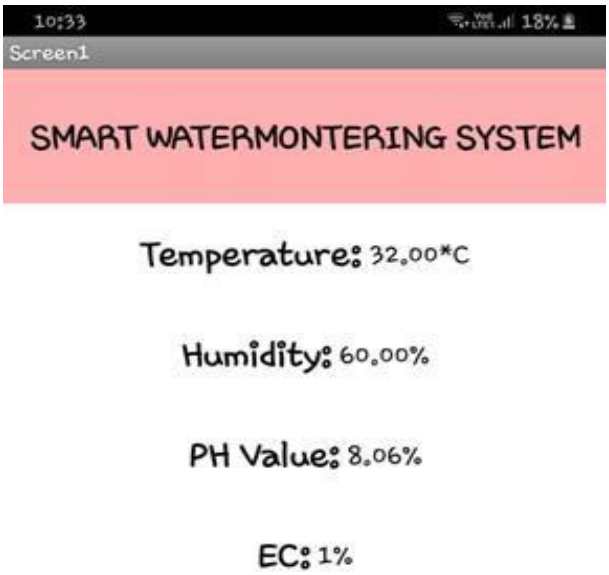

Fig.7. shows the monitoring of the sensors in the mobile application

The different water samples with the parameters observed are defined in the Table 1.

Table.1. **Parameters for water quality check**

	Parameters for water quality check			
Water Samples	**EC**	**Temperature**	**Hum**	**Ph**
Distilled water	0.05µS/cm	**31 °C**	66.00	5.8
Ground water	500 µS/cm	**31 °C**	66.00	8.5
Seawater	1,500 m/s	**31 °C**	66.00	7
Rain water	200 µS/cm	**31 °C**	66.00	5.6

VIII. CONCLUSION

In the system design, the water monitoring system is designed using Internet of Things technology. The parameters are focused to show the high-performance results, accurate and reliability with device. The device is tested in the real time and further experimental results are observed. In the future, these sensors gathered data sets can be used to predict the water quality by the analytics of the data. With the sense of prediction, certain actions can be taken to be used for different purposes. The data related to water quantity and quality are also predicted in the future and acknowledge the current scenario to act with more strategic solutions.

REFERENCES

1. Thinagaran Perumal1, et al., "Internet of Things Enabled Water Monitoring System ", IEEE 4th Global Conference on Consumer Electronics, 2014.
2. Perumall, at al., "Proactive architecture for Internet of Things (IoTs) management in smart homes," Consumer Electronics, IEEE, pp: 16-17, Oct. 2014.
3. N Vijaykumar, "The real time monitoring of water quality in IOT environment", IEEE innovations in information, embedded and communication systems, 2015.
4. Saima Maqbool, Nidhi Chandra, "Real Time Wireless Monitoring and Control of Water Systems using Zigbee 802.15.4", International Conference on Computational Intelligence and Communication Networks, 2013.
5. Prachet Varma, et al., "IoT based water management System for a Campus", IEEE International Smart Cities Conference, 2015.
6. Asaad Ahmed Mohammed ahmed Eltaieb, Zhang Jian Min, "Automatic Water Level Control System", International Journal of Science and Research, 2013.
7. S.Kartakis, W. Yu, R. Akhavan, and J. A. McCann, 2016 IEEE First International Conference on Internet-of-Things Design and Implementation, 978-1-4673-9948-7/16 © 2016 IEEE .
8. Mithaila Barabde, shruti Danve, Real Time Water Quality Monitoring System, IJIRCCE, vol 3, June 2015.
9. A. Purohit, U.k. Gokhale, "Real Time Water Quality Measurement System based on GSM," IOSR (IOSR-JECE) Volume 9, Issue 3, Ver. V (May - Jun. 2014) .
10. Z. Sun, C. Harold Liu, C. Bisdikia_, J. W. Branch and Bo Yang, "Mesh and Ad Hoc Communications and Networks," 2012 9th Annual IEEE Communications Society Conference on Sensor.

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