International Journal of Research in Advent Technology, Vol.6, No.11, November 2018
E-ISSN: 2321-9637
Available online at www.ijrat.org

IoT Based Water Quality Monitoring System Using Blynk App

Suganya P[1], Hariharan S[2],
Department of computer science[1,2],Periyar maniammai institute of science and technology[1,2]
Email: sugu0805@gmail.com[1] ,harisomu26@gmail.com[2]

Abstract-Water Water is Elixir Of Life essential for human survival & Agriculture, However, it is estimated that millions of people worldwide are deprived of safe drinking water. Polluted water is responsible for different kinds of human health problems and accounts for a number of diseases and deaths in India & access to drinking water is a problem for much of the developing world. Hence water quality monitoring is very essential to keep our planet healthy and sustainable. Since the Existing systems are having difficulty in terms of management complexity, application development. Our proposed system will offer a lesser complex solution without neglecting the objective. We propose an Internet of Things (IoT) based system which automatically measures various water pollution parameters and the reading collected by each sensor can be accessed from any smart device supported by Android or IOS using Blynk App with less effort.

Keywords - Water Quality Monitoring, IOT, Blynk App

1. INTRODUCTION

Water covers over seventieth of the earth's surface and found to be a vital resource for folks and the environment. River waters that provide drinking water for population & Agriculture irrigation are considered to be polluted with different types of pollutants coming from industries and mining, untreated sewage and agriculture .Water pollution affects water, rivers, lakes, and oceans everywhere in the world. In India, access to safe drinking water is a challenge. This consequently harms human health.

In the traditional method of water quality testing, samples are collected manually and then analyzed in the laboratory. This method wastes too much manpower and need the material resource, and has the limitations of the samples collecting, long-time analyzing, the aging of experiment equipment and other issues. The sensor is an ultimate solution for detecting the physical parameters. It can convert non-power information (physical parameters) into electrical signals.

Parameters to be monitored or ensuring water quality are temperature, pH vale, turbidity rate, conductivity, dissolved oxygen (DO) rate, chemical oxygen demand (COD), biochemical oxygen demand (BOD), ammonia nitrogen, nitrate, nitrite, phosphate, various metal ions and so on[3].

The traditional method is not able to meet the demands of water quality monitoring. To overcome this issue automatic remote monitoring is developed in which Various parameters of water quality are automatically detected under the control of single-chip microcontroller The controller chip gets the data and followed by processes and analyzes. After that, the data are instantaneously sent to the monitoring center by GSM network in the form of SMS. If the water quality is nonstandard, the data will be sent to the monitoring center and management's mobile in the same way at the same time. It is convenient to take corresponding measures timely and be able to detect the quality of water remotely[1].

Later IOT based water quality monitoring system has been evolved**.** This system consists of sensors which measure the essential water quality parameters. The measured values from the sensors are processed by microcontroller and these processed values are transmitted remotely through raspberry pi using Zigbee protocol[4]. Finally, collected data can be viewed on internet browser application using cloud computing[2].

The IOT allows objects to be sensed and remotely controlled remotely across active network infrastructure, creating opportunities for direct integration of the physical world into Computer-based systems, and leading to enhanced potency, accuracy additionally to reduced human intervention.

Since the Existing water quality motoring system need server maintenance and new application development. Our proposed system will offer lesser complex solution without neglecting the objective.

Here we propose a IOT based system in which NodeMCU collects the data from sensors after that, the data are instantaneously sent to monitoring device by Blynk App from NodeMCU. If the water quality is abnormal, the data will be sent to the monitoring center and management's mobile in the same way at the same time

Blynk platform is compatible with iOS and Android app and controls Arduino, Raspberry Pi. It is a digital dashboard where you can build a graphical interface and it provides a server for each and every user in the app select NodeMCU board.

Monitoring mobile App receives the data and then

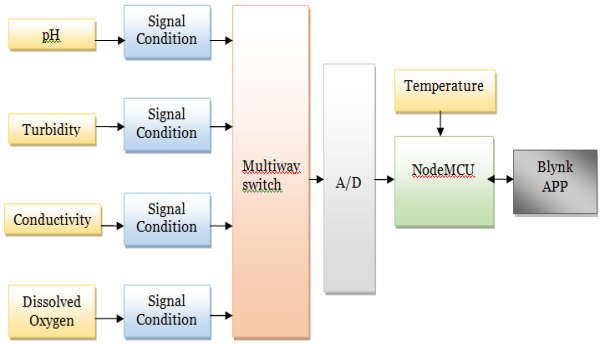

Fig. 1. Block diagram of the system

for your own project by simply dragging up and dropping down the widgets.

Why BLYNK App?

Blynk App provides a server for us to save the data and they provide the application to view the data in this android app (BLYNK), No need to create the external server and Android app. No need for maintenance. Using the blynk we need not put effort for server and creating an app. Just it reads the data and give the information through that app it is safe and secures it access through your user id.

Blynk is not stick to some specific board or shield. Instead, it is a supporting hardware of our choice. Whether Arduino or Raspberry Pi can be linked to the Internet over Wi-Fi, Ethernet or new ESP8266 chip, Blynk will bring you online and get ready for the Internet Of Your Things.

2. METHODOLOGY

2.1. *Overall design of the system*

As figure 1 shows, the system consists of multiple water detection sensors, data acquisition module, monitoring center, and other accessories. Temperature sensor used in this system directly converts the temperature signal into digital signal. Other water quality sensors transform the detected chemical signals into electrical signals, amplified by the signal conditioning circuit[5].

The multiway switch selects one signal and send to A/D analog to digital converter .Then it is converted into a digital signal. The NodeMCU act as a microcontroller unit reads and processes the digital information. Blynk app gets the data from NodeMCU analyzes, classifies, saves them and draws corresponding graphs. That can instantaneously monitor and alarm the situation of water quality. If the water quality is abnormal, NodeMCU will control the transmission module to send data to the monitoring mobile.

The alarm in the monitoring mobile activated. At the same time, the data are sent to management mobile phone in this way. It is easy for management to take corresponding measures immediately.

When needed, management can also send commands through Blynk App to data collection terminal. The system can do all-weather real-time monitor to water temperature, pH, conductivity, turbidity, dissolved oxygen, and other water-quality guidelines.

2.2. *Water detection sensors*

Water detection sensors determine the system's accuracy and cost. Generally, they are very expensive on the market. In order to reduce the cost, we choose DS18B20, make conductivity sensors, turbidity sensors and pH sensors by ourselves, and purchase dissolved oxygen sensor of U.S. Global Water. Temperature is one of the five common water quality parameters. Thermoelectric power temperature sensors and heat resistance temperature sensor are commonly used to detect water temperature. But thermoelectric power temperature sensors require temperature compensation, and the output of the heat resistance temperature sensor is not conducive to signal to test. DS18B20 is produced by U.S. DALLAS Semiconductor Company. It is a digital temperature sensor, using single-bus protocol. The testing temperature range is -55 ° C+125 ° C, and the

accuracy between -10 ° C~+85 ° C is ± 0.5 °. Therefore, the DS18B20 temperature sensor is chosen. Conductivity sensors are generally divided into two types: two electrodes or multiple electrodes. The conductivity of two electrodes is commonly used interiorly. Generally, two conductivity electrodes in the laboratory can be made by using two platinized platinum to sinter on two parallel glass or inner wall of the round glass tube. Changing the size of platinum pieces and adjusting the distance between them can make a different constant value of two conductivity electrodes. Turbidity is caused by suspended particles in water. Suspended particles block a lot of incident light and scattered light. It also diffuses the incident light. Therefore, photo electricity sensor is used to detect turbidity.

pH value is tested by the method of electric potential. A primary cell made by a constant potential reference electrode and measuring electrode is used in the method. A pH glass probe, which is sensitive to pH, is on a measurement electrode. It is made of a special glass that can conduct electricity and permeate hydrogen ion.

The potential can be produced when the glass probe touches the hydrogen ion. Different pH in the water generates the corresponding potential. It can be converted into 4~20mA output

by the transmitter. The amount of dissolved oxygen in water is a very important indicator of water quality. The system uses WQ401 dissolved oxygen sensor produced by the U.S. Global Water Company. It is a three-electrode structure and three-wire configuration. If the electrolyte deteriorates, the sensor can diagnose itself. Temperature compensation of it can reach 25 ° C; the output is 4-20mA; the testing range is 0-8ppm; accuracy is ± 0.5% of full scale; operating temperature is -40 ° C-+55 ° C. It is removable and easy to maintain.

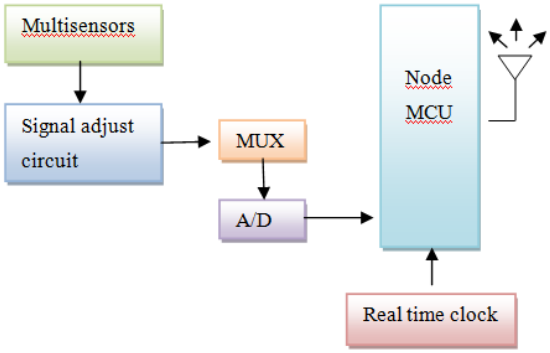

Fig. 2. Block diagram of Data Acquisition Module

2.3. *Design of data acquisition module*

The construction of the Data acquisition module is shown in Figure 2. The signals collected by sensors of water quality monitoring need to be amplified because the output of them is in millivolt or milliampere. Then CD4051 multiple-way switch selects and sends a signal to A/D converter. It converts analog signals into digital signals that the NodeMCU can read. CD4051 is a single 8-channel digital control of analog electronics witch with low on-resistance and low cut-off leakage current. NodeMCU collects and sends the data to the communication interface. Meanwhile, it reads and processes the commands which feedback from monitoring center and administrators. Lithium cell and solar battery are combined as a power supplier. So the system can continuously work about 100 hours on cloudy days and 30 days on sunny conditions. In order to ensure the time accuracy of collecting, sending data and saving SCM internal resources, and be easy to find out the appearing time of abnormal data, the NodeMCU adds a DS1302 clock chip.

3. Software Design of the System

3.1. *Software design of data acquisition module*

The software program of microcontroller data acquisition module mainly includes these functions: data collection, ADC, timing, comparison with standard parameters that have been saved, Blnky App, etc. Different timing corresponds to different A/D sampling rate. The NodeMCU reads the data after A/D

converting. Then it uses Blnky App which sends the data by existing network in the form of Blnky server and then to monitoring mobile. Meanwhile,

connect your data acquisition module to your Smartphone
- Add a Widget

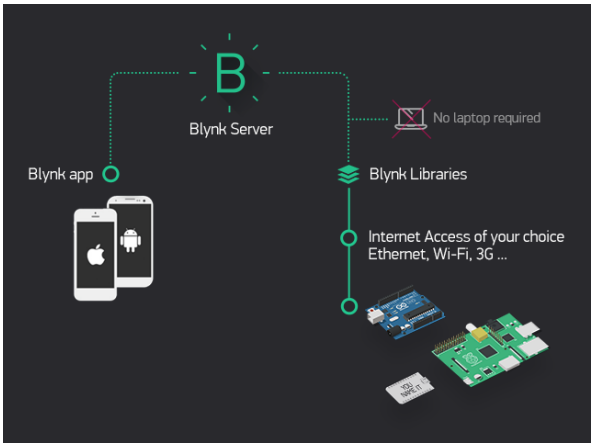

Fig .3. Architecture of IoT based system using Blynk App

NodeMCU compares the collected data with standard parameters. If the data is beyond the standard range of water quality parameters, it sends data to the monitoring center and management's mobile through Blnky App. So it is convenient for management to take corresponding measures timely.

3.2. *Software design of monitoring center*

There are three major components in Blynk platform[6]:

- Blynk App allows to you create interfaces for our project using various widgets
- Blynk Server is responsible for all the communications between the smart mobile device and data acquisition module. Blynk Cloud can be used or private Blynk server locally. It is an open-source, easily handle thousands of devices and can be launched on a Raspberry Pi.
- Blynk Libraries is compatible for all the popular hardware platforms and can enable communication with the server and process.

3.2.1 Steps to create a Blynk Account

- Download and install Blynk App for Android or IOS in a smart device
- Create New Project
- Choose Ur Hardware (IOT board and the connection type needs to be selected)
- Get Ur Auth Token- Auth Token is a unique identifier which is needed to
- Run The Project.

4. CONCLUSION

Automatic measurement and reporting system of water quality based on IOT makes use of water detection sensor with a unique advantage and existing blynk App. This smart system can monitor water quality automatically can be accessed from any smart device supported by android or IOS. , and it is low in cost and does not require people on duty. So the water quality testing is likely to be more flexible, economical, convenient and fast. Just by replacing the corresponding sensors and altering the relevant software programs, it can be used to monitor other water quality parameters. The system can be extended to keep an eye on air pollution, industrial and agricultural production and so on. It has widespread application and extension value.

REFERENCES

[1] V. Raut; S. Shelke.(2016):Wireless acquisition system for water quality monitoring. Conference on Advances in signal Processing (CASP), pp. 371-374.
[2] Jayti Bhatt;Jignesh Patoliya.(2016):IoT Based Water Quality Monitoring System.International Journal of Industrial Electronics and Electrical Engineering,vol.4,Issue 4.
[3] Zhou Na;Zhu Yantao.(2009):Sensors in the application of water quality monitoring. Environmental Science Tribune, 28(Supplement),pp.119- 123.
[4] ZulhaniRasin;Mohd Rizal Abdullah.(2009): Water Quality Monitoring System Using Zigbee

Based Wireless Sensor Network. IJET-IJENS, vol. 9, no. 10, pp. 14-18.

[5] NazleeniSamihaHaron;MohdKhuzaimiB Mahamad; Izzatdin Abdul Aziz; MazlinaMehat. (2009):Remote Water Quality Monitoring System using Wireless Sensors. Proceedings of the 8th WSEAS Int. Conf. on Electronics, Hardware, Wireless and Optical Communications, pp.148-154.

[6] https://www.blynk.cc/.