

SMART WATER QUALITY MONITORING SYSTEM



An Internet of Things (IOT) Application

❑ **Traditional method of Water Quality monitoring**

Traditional methods of water quality involve the manual collection of water sample at different locations, followed by laboratory analytical techniques in order to the character the water quality. Such approaches take long time and are no longer to be considered efficient. Central Water Commission (CWC) monitors water quality, by collecting samples from respective locations within the processing & distribution system. These samples are analyzed at the well-equipped laboratories. At these laboratories' samples from raw water, filter water and treated water are taken for analysis. The estimation of water parameters like turbidity, pH, dissolved oxygen, etc. is done with the help of meters.

The disadvantages of this existing system are;

1. There is no continuous and remote monitoring.
2. Human resource is required.
3. Less reliable, no monitoring at the source of waters i.e., no on-field monitoring and the frequency of testing is very low.

Due to these disadvantages of the existing system, it is required to develop a system that will allow real time and continuous monitoring of water quality.

□ SMART WATER QUALITY MONITORING

The proposed IOT technique is utilized to defeat the disadvantages present in existing strategy. Here, we can utilize Raspberry pi as center controller and different sensors to screen the water Quality. The outline of our framework is in Figure 1. Here we can use basic sensors which are pH, turbidity, temperature, Nitrate ion rod. Core controller unit (CCU) as the main processing module and one data transmission module i.e., Wi-Fi module or GSM module. The Core controller unit (CCU) is a significant part of the system developed for water quality measurement because the Raspberry Pi consumes low power, and it is a small size, where the size is a good use for a crucial point-of-sale technology criterion. All the sensors' data processed by the CCU and is updated to the cloud server using the Wi-Fi data communication module or GSM module. Authorized users can access these data using a user ID and password for accessing data on the cloud server by logging into their accounts. The information is gathered, stored, analyzed and transmitted in real-time.

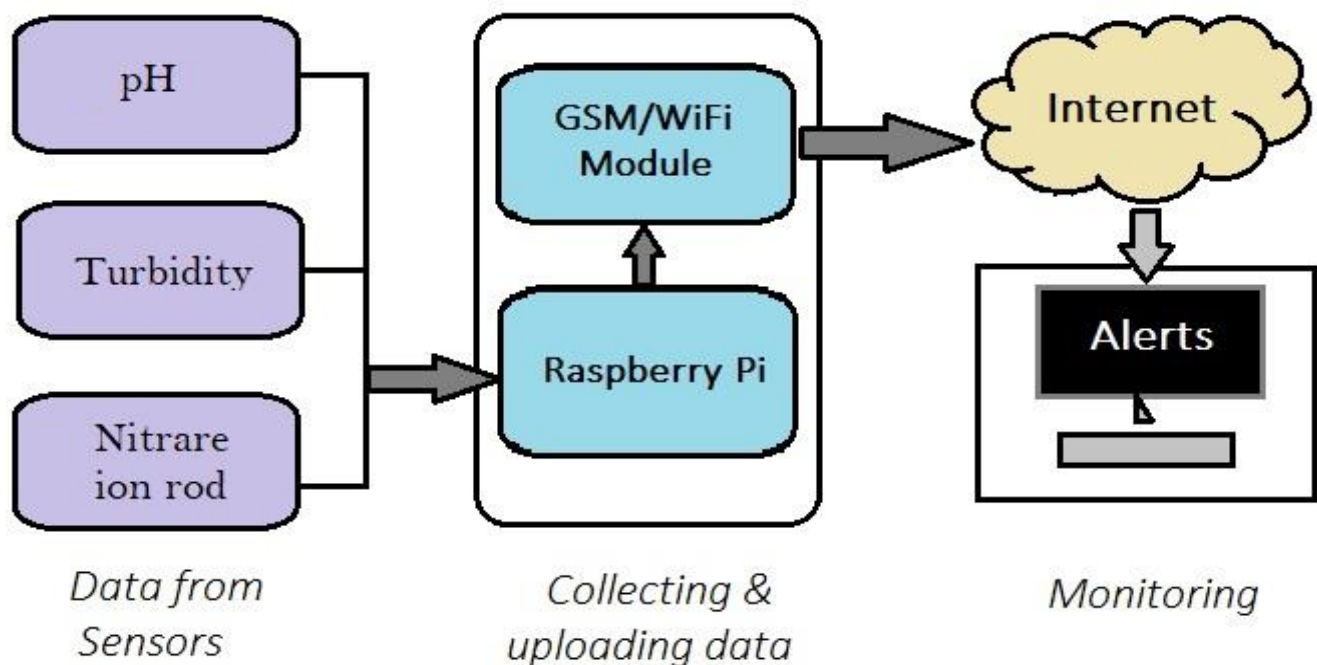


Figure 1

❑ OBJECTIVES

To develop a system for real time quality assessment of water health using Raspberry Pi, various basic sensors and cloud server in the **IOT** ecosystem.

Following are the objectives of **Smart Water Quality Monitoring** :-

- To record depletion in water quality at the earliest.
- To monitor whether the water quality is in compliance with the standards, and hence, suitable or not for the designated use.
- To alert the concerned authorities and locals about the recorded depletion in the quality of water.
- To create database of all variations recorded in water quality of given source for future study.

□ METHODOLOGY

Here is the methodology of real-time monitoring of water quality in IoT environment. The overall working of the Smart Water Quality System is given in the Fig 2.

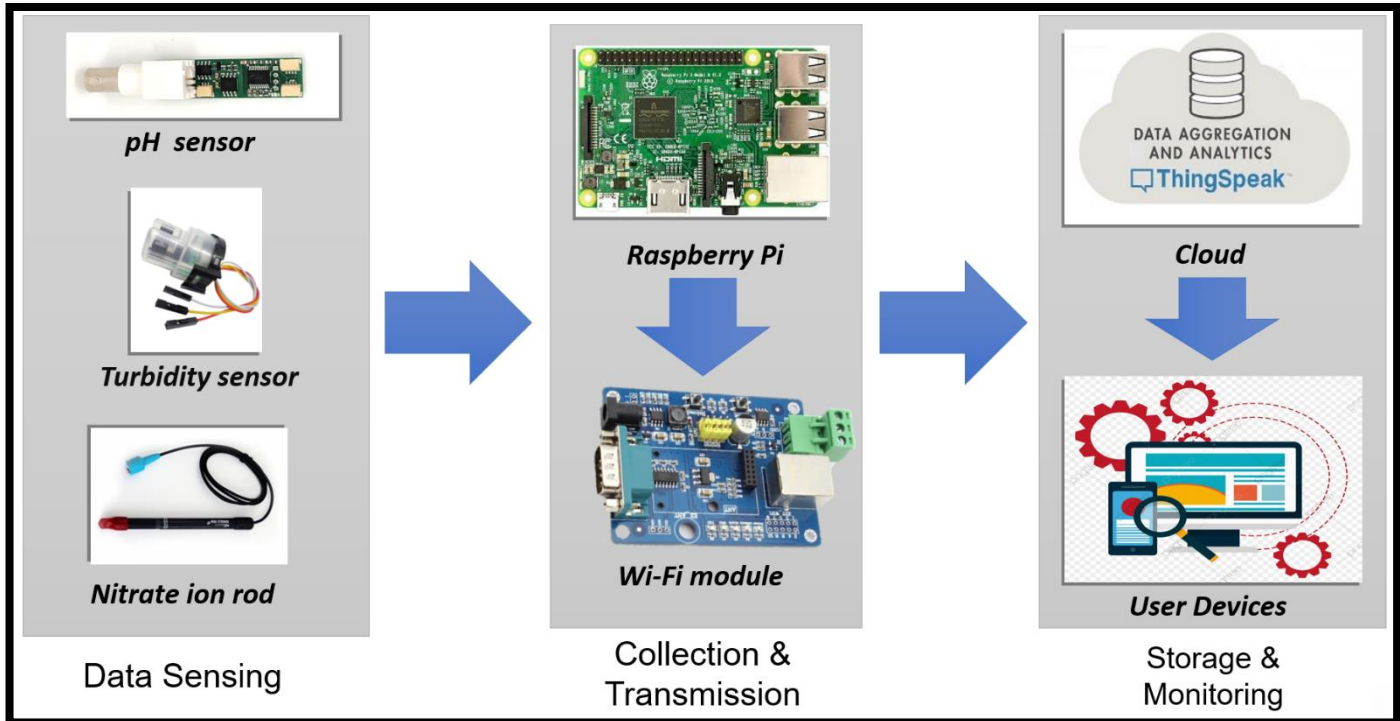


Figure 2

As shown in the figure 2, the system consists of several sensors (temperature, pH, turbidity) that are connected to core controller. The core controller is accessing the sensor values and processing them to transfer the data to internet via the Wi-Fi module or GSM module. The sensor data can be viewed on the Cloud application.

The overall process can be classified into 3 stages: -

- 1. Quality Parameters Sensing**
- 2. Collection and Transmission of Quality Parameters**
- 3. Storage and Monitoring of Quality Parameters**

□ APPLICATIONS

Smart Water Quality Monitoring (SWQM) system can be deployed at various places where there is need or necessity to monitor the water quality parameters seamlessly. Figure 4 shows the deployment of SWQM at different locations.

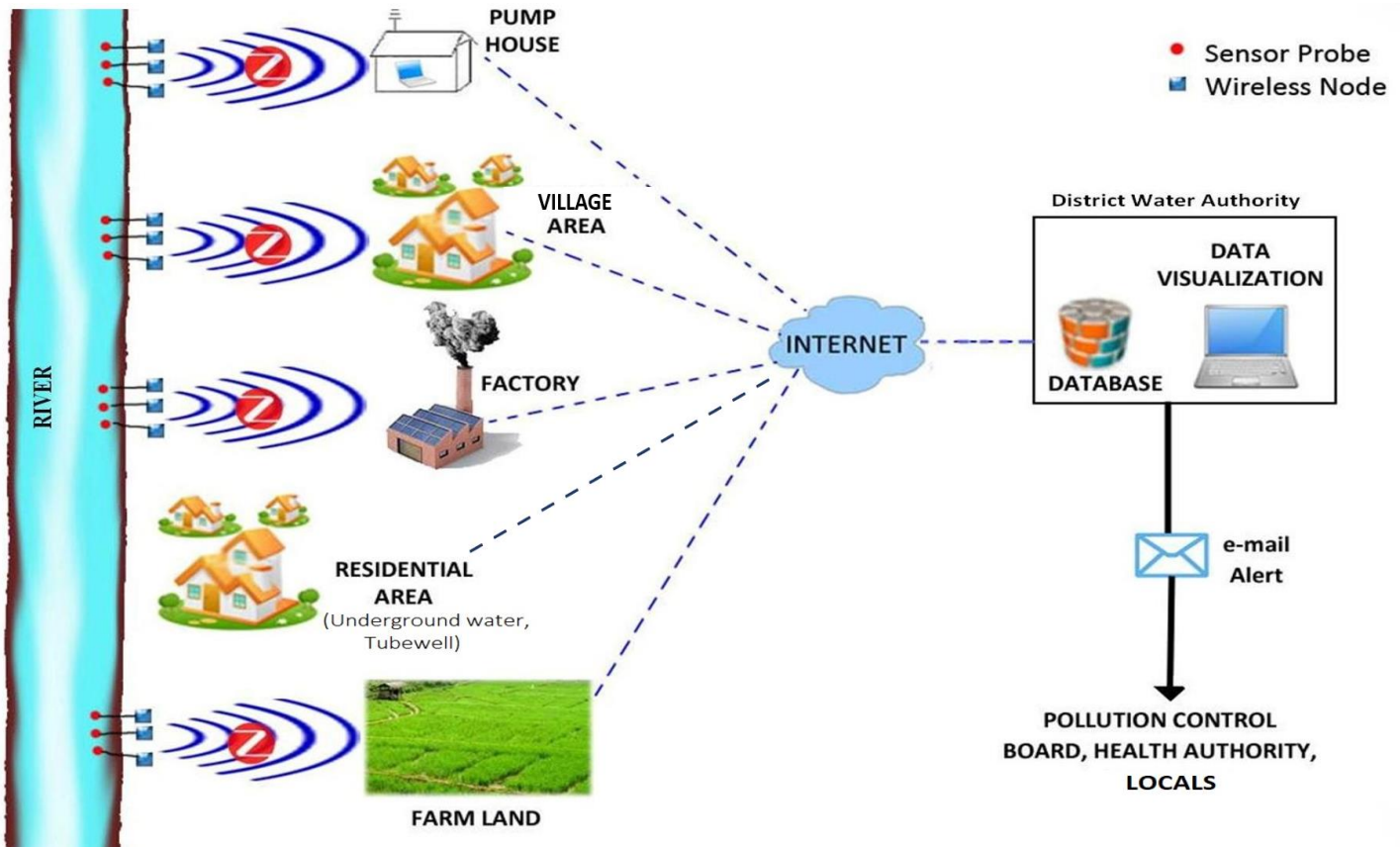


Figure 4

SWQM can be deployed at :-

- Pumphouse & Water Treatment Plant
- Village area & Farmlands
- Industries & Factories
- Residential area

❑ OUTCOME AND UTILITIES

In this age of Technology where every device and machines are connected which provide convenience to the user, where user can get every minute data and control at its finger tips. Utilizing the current state of art **IOT** technologies in monitoring the quality of water can be more effective and efficient compared to traditional techniques which are performed manually.

Monitoring Water quality wirelessly using Internet of Things (IoT) applications provides unique blend of benefits and utilities over the traditional method of Water quality monitoring.

- ❖ The system can monitor water quality automatically, and it is low in cost and does not require people on duty. Thus, the water quality testing is likely to be more economical, convenient and fast.
- ❖ Monitoring of the remote water bodies/reservoirs can be done wirelessly at any location. This makes the monitoring seamless and real-time.
- ❖ This system can detect the depletion in the water quality at very instance and can alert the concern authorities that may help to avoid any calamity.
- ❖ The system has good flexibility. Only by replacing the sensors and changing the relevant software programs, this system can be used to monitor other water quality parameters.

□ CONCLUSION

Monitoring of real time quality of water from reserve tank of house and colony makes use of pH, turbidity and temperature sensor with Raspberry Pi and existing Cloud system for data analytics. The system can monitor water quality automatically, triggers alarms immediately to prevent any health hazards and it is low in cost and does not require people on duty. Following conclusions can be drawn for **IOT** in Water Quality Monitoring:-

- Use of various sensors and communication devices makes it easy to monitor the quality of water continuously.
- We can get warning regarding the depletion of quality, react to it and trace its source at the earliest.
- Authorities can conveniently keep a check the industries whether they are complying to the standards of waste water management.
- Collected data in cloud can help researchers to carry out analytics & studies on water quality and management.