

SSN COLLEGE OF ENGINEERING

KALAVAKKAM-603110

INTERNALLY FUNDED STUDENT PROJECT - 2019

**IOT ENABLED WATER QUALITY MANAGEMENT
AND CONSERVATION-
SMART WATER STORAGE**

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Budget(in thousands):

Rs.12,000

Project Duration(in months):

10 months

(Under)

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Signature of the Project Students

Signature of the Project Guide(s)

Signature of the HOD

1. Project Title : IOT enabled water quality management and conservation - Smart Water Storage.

2. Broad Subject : Internet of Things, Water Conservation, Water Quality Management, Big Data.

3. Project Duration : 10 months

4. Budget : Rs.12,000

5. Project Summary:

The smart water storage system aims to implement four main functionality in domestic storage tanks: Quality Management, Water Level Sensing, Water Consumption Measurement and Collective Data Analysis.

The system has the capability to sense the quality of the water using various parameters such as temperature, ph value, turbidity and Total Dissolved Solids. It can sense the level of the water in the tank using ultrasonic sensors. It notifies the user when the tank is full and when it is about to be empty and switches the motor on and off automatically. The user can control the motor using an app too.

The system will give precautionary warning to the user to consume less water when there is no rain for a long time and when sensing decreasing ground water level.

All these data is collected and stored in cloud. These information can be viewed via an android application.

These systems installed in many households will provide collective data. These collective data will help us understand the general water usage by households accurately. The larger the data, the more valuable insights we will get. This will enable us to understand the trend in water usage and water wastage in different places. These systems could also be installed in large water bodies and large water tanks with leak detection system that would avoid wastage of water in huge amounts.

6. Keywords:

Arduino, Internet of Things, Sensors, Android Application, Big Data and Blynk.

7. Objectives:

- ◆ To consume water using IOT.
- ◆ To avoid wastage of water due to human errors.
- ◆ To monitor the quality of the water source and to provide access to clean water to every household.
- ◆ To track water usage and take preventive actions before severe drought by monitoring ground water level and weather patterns.
- ◆ To collect valuable data regarding water usage and wastage using Internet of Things.
- ◆ To provide very cheap devices to conserve the most precious resource.

8. Introduction:

The smart water storage system gives the user the awareness about how much of water he/she is using. The app displays a prescribed level of usage and if the user crosses the level, a warning is given. When the tank is full, the system switches off the motor. The user can control the motor using an application from anywhere. The quality management component of the system ensures that a safe and portable water is available and prevents spread of water borne disease.

9. Definition of the Problem

The most common problem in Tamil Nadu and all over India is drought. Each year during peak summer, millions of people are affected due to water scarcity. In 2019, the water scarcity hit new levels forcing schools, restaurants, hotels to close bringing livelihood of the people to a halt. The four main reservoirs of Chennai were all dried up. The main cause of the problem is due to the improper handling of water resources and over exploitation of the water resources when it was abundantly available. Along with the scarcity came another serious problem, unclean water distribution. This led to the widespread of water borne diseases. It is important to treat water as a precious resource and it has to be used conservatively with measured usage. In the near future the water shortage might force people to migrate to other areas. To avoid such crisis, it is important to restrict the usage of water and it is our responsibility to avoid wastage in every possible way.

We aim to develop an system that measures the water usage and at the same time analyse the water quality. The Smart Water Storage system will also aid in avoiding water wastage due to human errors.

10.REVIEW OF STATUS OF RESEARCH AND DEVELOPMENT IN THE SUBJECT:

10.1 National Status

- Jayti Bhatt and Jignesh Patoliya proposed an IOT based water quality monitoring system which measures parameters like ph value, temperature, turbidity etc.
- Mahalakshmi C.V.S.S, Mridula B and Shravani D published a paper on water level sensing using iot with ultrasonic sensors. The paper implements the design of a water level sensor which detects the level of water with the help of ultrasonic sensors.

10.2 International Status

- Fiona Regan, Antoin Lawlor and Audrew McCarthy published a report titled “Smart Coast Project” in which they mention a smart water quality management system that could be deployed in large water bodies

11. Novelty Importance of the proposed project in the context of current status

The smart water storage system is an integrated system with various functionality. All the other projects focuses on either water quality management or water level sensing. The water quality management in other projects are proposed for large water bodies. We aim to implement it for domestic water supply since in most parts of India, ground water is directly pumped using borewell and monitoring large water bodies is of no use in such case. The water might also be polluted in the tank itself. **Our primary focus is to collect large data from multiple devices and use the data to analyze trends** which is not proposed in other projects.

12. Patent Details

--NIL--

13. Work plan and Detailed Technical Information

13.1 Methodology

The smart water storage system senses the level of water using ultrasonic sensor. The quality of the water is determined using a combined system of sensors which measures various parameters of the water such as temperature, pH value, turbidity, and total dissolved salts. The amount of water used is measured using a water flow meter. The user is intimated about all the above information via an app.

Hardware Components:

Water quality monitoring system:-

A. Ph sensor

Ph sensor detects the pH value of water solutions. pH is the hydrogen ion concentration in water solutions which indicates the acidity and alkalinity in the solution. The normal range of pH is 6 - 8.5.

B. Temperature sensor

The temperature sensor measures the temperature of the water source. Temperature is a key element for measuring water quality.

The temperature of the water system is directly proportional to ionization rate. The ph value too is temperature dependent. Thus for accurate results, temperature is necessary.

C. Turbidity Sensor

Turbidity is the measure of number of particles in water. The turbidity of the water is measured in Nephelometric Turbidity Units (NTU). Turbidity is the optical property of water and indicates the amount of light scattered by the suspended particles in water. Highly polluted water has high turbidity.

D. TDS Sensor

TDS stands for Total Dissolved Solids. It is the dissolved combined content of organic and inorganic substance in a liquid.

Water level and consumption measurement:

A. Ultrasonic Sensor

The ultrasonic sensor generates an ultrasonic wave which hits the water and the reflected wave is sensed by the sensor. By taking in account the speed of the wave and the time taken to receive the reflected wave, the level of the water is measured.

B. Water Flow Meter

The water flow meter is capable of sensing the amount of water flowing through the pipe which it is connected using which the total consumed water by a household.

C.Water Pump

D. Single Chanel Relay Board

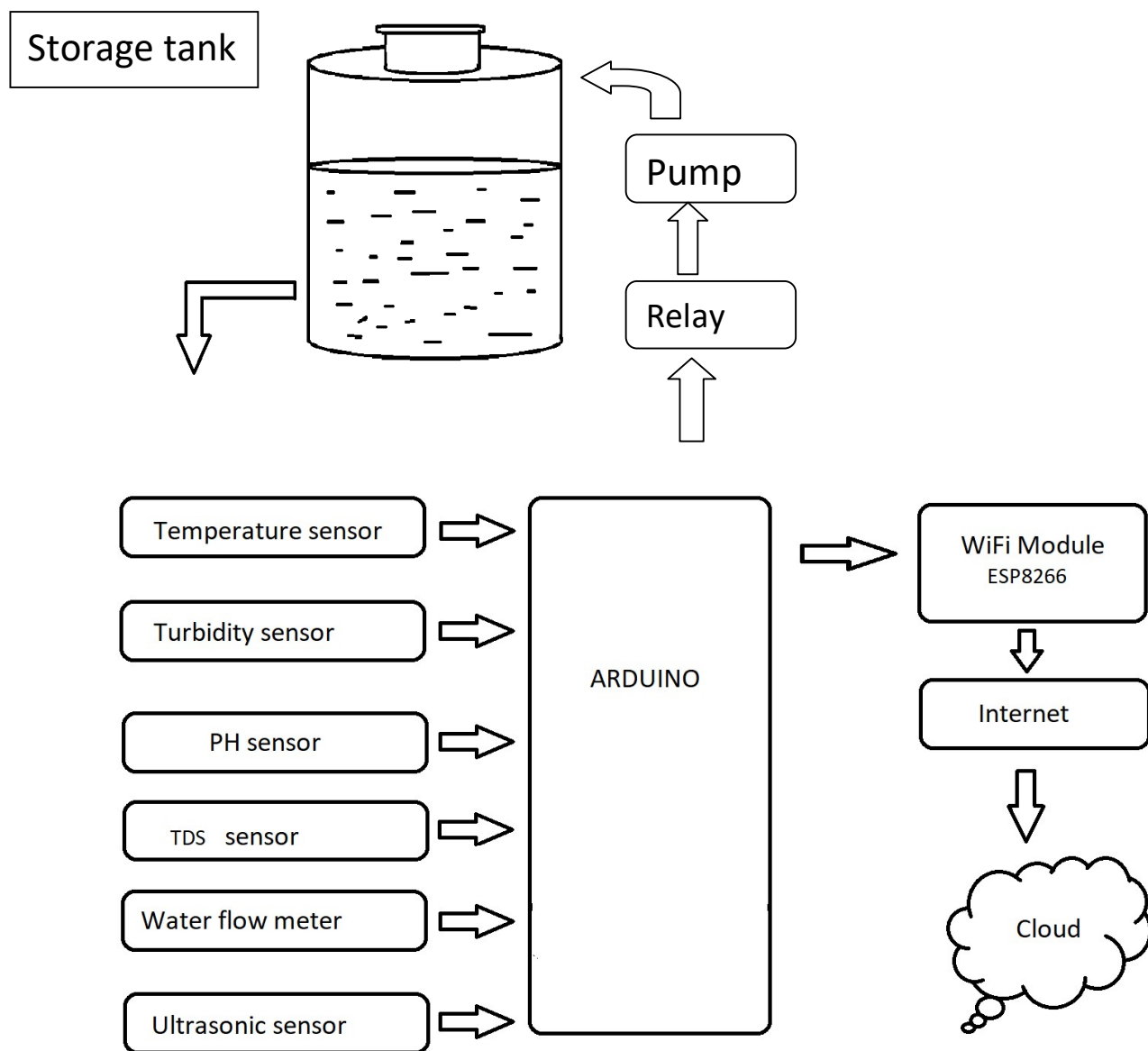
To control the water pump.

Software Components :

Blynk :

Blynk is an IOT platform that helps in developing android application which displays information received from the arduino sensors and gives user the control.

13.2 Block Diagram



14. Time Schedule of Activities through BAR Diagram

[illegible]

15. DELIVERABLES

- Automatic water level detection and intimation via app.
- Water Pump control through android application.
- Water quality control and warning system.
- Water consumption measurement and informing the user the prescribed level of water usage according to weather patterns and ground water level.

16.TARGET BENEFETIALS OF THE PROPOSED PROJECT:

- Cost effective.
- Provides accurate data related to water usage.
- Prevents spread of water bourne diseases.
- Avoid water wastage due to overflow.
- Provides awareness to the user regarding water usage and wastage.
- User friendly and easy to install.

