

IOT Based Water Management And Supply System

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ABSTRACT

This system represents the initial steps in the development of a water distribution and quality monitoring system. This system is based on a wireless sensors network to detect and locate in real time any change in water quality, quantify its importance, evaluate its consequences and determine the most appropriate actions to be taken to limit its effects. First, we start with determining of the quality control points of the water. Then, we move on to the development of a water level for future prediction in the water distribution system. Finally, taking into account the environmental parameters of our system, we propose a water distribution system based on the IOT concept we use different sensors to manage the water.

Keywords: Water management, Flow sensor, Ultrasonic Sensor, Wifi-Module, Notification.

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I. INTRODUCTION

Water is one of the most important basic needs for all living beings, but unfortunately, a huge amount of water is being wasted because of uncontrolled use and exploitation of water resource. Kerala averages rainfall of 3,000 mm a year. The general impression was that among all the states in India, Kerala had ample drinking water, but it's not the case. There are 1,164 problem villages without the adequate supply of drinking water. Even though Kerala has 44 rivers spanning its lush green landscape. Together, they contribute an annual discharge of 72, 00 million cubic meters of water which is unused to the Arabian Sea. One of the main reasons for the shortage is poor management of water. Overflowing water tanks in residence, schools, colleges, Municipal overhead tanks, Hospitals etc. can contribute to the massive amount of water wastage. If we can control this we can save large amounts of water. Conventional water tanks can neither monitor nor control the water level in the tank. As of now, the water level has to be manually checked and refilled according to the requirements. So

in this paper, we solve all the above mention problems with automatic water level detection and refilling of water storage system with the help of Internet of Things (IoT).

Problem statement:

To develop IOT system which address all water distribution and monitoring problems and reduce man power as well as consume less time.

II. LITERATURE SURVEY

[1] Monitoring system as a tool for risk evlution in water distribution system Alicja Balut, Andrzej Urbaniak 2018

In this paper, we monitor the quality of water and get the result on IOT. And we distribute the water by connecting the flow sensor.

[2] Real-time clustering for priority evaluation in a water distribution system Alexandru Predescu, C~at~alin Negru, Mariana Mocanu, Ciprian Lupu 2018

Nowadays with the development of smart infrastructure for water resource management, there is an increased need for efficient operation and management of water distribution infrastructures. In this paper, we propose a system for real-time clustering system priority evaluation in a water distribution system.

[3] Optimal Demand Response Scheduling for Water Distribution Systems Konstantinos Oikonomou, Roohallah Khatami 2018

As energy intensive infrastructures, water distribution systems (WDSs) are promising candidates for providing demand response (DR) and frequency regulation services in power systems operation. However, models that tap the full flexibility of WDSs to provide the services while respecting the operational constraints of water networks are remained scarce.

[4] Smart Water Distribution Management System Architecture Based on Internet of Things and Cloud Computing Sawsan Alshatnawi, Irbid Jordan 2017

The fast population growth needs to provide clean and affordable water that meet the human requirements. The water faces a problem in the future because of global climate change. An efficient water management and treatment is necessary to keep water quality and availability.

[5] A Novel Smart Water-Meter based on IoT and Smartphone App for City Distribution Management M Suresh, U. Muthukumar, Jacob Chandapillai 2017

A novel approach to performing automated water-meter reading for update of consumption information from field to the Utility office is described in this paper. The smart metering approach proposed differs from existing commercial methodologies by making use of low cost IoT hardware and smartphone app.

[6] Feasibility Study on Wireless Passive SAW Sensor in IoT enabled Water Distribution System Zhaozhao Tang, Wenyan Wu, Jinliang Gao, Po Yang 2017

Internet of Things (IoT) technology has recently been widely utilized into a variety of industrial applications. Wireless Passive Surface Acoustic Wave (SAW) sensors have attracted great attention in numerous IoT enabled applications. The sensor nodes are not directly supplied by the power supply as it absorbs the energy from the interrogating Radio Frequency (RF) pulses to excite the SAW.

[7] Research on placement of water quality in water sensor in water distribution systems Chengyu Hu 2017

In this paper, we use turbidity sensor, ultrasonic sensor, Ph sensor and flow sensor for monitor and distribution of water.

[8] Design and realization of water quality information management system Dongling Ma, Jian Cuil 2017

In this paper, we make the water quality monitoring system and distribution. We distribute the water by using flow sensor. And check by using turbidity sensor and ph sensor.

[9] Temperature dynamics and water quality in distribution systems B. J. Eck, Saito S. A. McKenna 2016

Quality assurance strategies for water distribution systems often include the application of chemical disinfectants to limit the growth and transmission of pathogens. Characteristics of water quality in individual systems, and the type of disinfectant employed, create significant complexity in understanding and quantifying the impact of disinfectants in different networks. An additional challenge is that disinfection by products (DBPs), created through the breakdown of disinfectants, can be detrimental to human health.

III. BLOCK DIGRAM

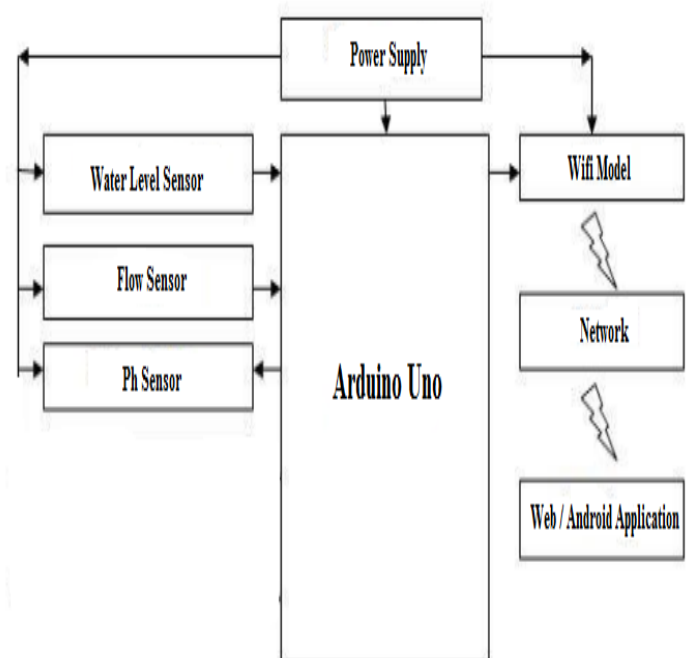


Fig 1. System block diagram

In the proposed smart android framework, a reconfigurable shrewd sensor interface gadget that coordinates information gathering, information preparing, and remote transmission is outlined.

The equipment of remote water quality checking framework contains the accompanying parts:

- Ultrasonic Sensor
- pH Sensor
- Controller (ESP)
- Flow sensor

IV. MATHEMATICAL MODEL

Mathematical Model:

$U = \{I, O, f, S, F, D, NDD\}$

Where,

$I = \{I1, I2, I3\}$

$I1 = \{I1, I2, \dots, In\}$ where n size of tank and $n > 0$

$I2 = f1$ i.e. pulse counted using flow sensor

$I3 = pn$ i.e. size of pipe

$O = \{O1, O2, O3\}$

$O1 =$ level of water present in tank

$O2 =$ water consumed by user

$O3 =$ bill generated

$f = \{f1, f2, f3, f4\}$

$f1 =$ QUANTITY (n, I1)

$f2 =$ FLOW_RATE (I2, I3, O2)

$f3 =$ CONNECT ()

$f4 =$ REP_GEN (f1, f2)

S: Success:

- Data send successfully
- Report generated or not

F: Failure:

- Sensors not working properly
- Connection failure

D: Deterministic value, n

NDD: Non Deterministic Data value:

- Levels detected are randomly generated

V. ALGORITHM STEPS

Algorithm: A pseudo code for controller is given below.

1. While (True):
2. Read control valve value
3. Is Control Valve Open = true
4. Read level sensor value, water flow value, bill generate amount and .

5. Water quality value != Okay

6. Turn off control valve

7. Generate warning message

8. Calculate pressure from water flow

9. Upload sensor value, water flow value, bill generate amount value to hosted database or local cloud.

VI. CONCLUSION

Our intention of this research work was to establish a flexible, economical, easily configurable and most importantly, a portable system which can solve our water wastage problem. It is a robust system and small in size. Our proposed system for water level monitoring comes under the field of Internet of Things (IoT). Our main objective was to design a smart system for approximating the water level in the tank and prevent overflow or analyse the water usage. This analysing feature can also help us in finding whether there is any leakage in the tank or not. Nowadays liquid level monitoring is vital in many industries too like oil, automotive etc. Using our smart system we can analyse the usage and also detect the leakage in the tanks of these industries.

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