ISSN 2395-1621

# Water Distribution with bill generation Using decision tree in python

Mr. Shradha Tate, Mr.Seema Copade, Mr. Jayram Aaglave,
Prof. Pravin Phopse

jayramaglave70@gmail.com,

Department of Electronics and Telecommunication

G.H.Raisoni College of Engineering and Management, Wagholi, Pune.

**ABSTRACT**

**In urban areas the water supply to residence and commercial establishments are provided at a fixed flow rate. There are incidents of excess water drawing by certain customers/users by connecting motor-pump sets to the water lines which is considered as water theft. In this project it is proposed to develop an embedded based remote water monitoring and bill generation system by recording the flow rates at the consumer/user end. In order to implement the proposed water supply system with automatically bill generation. The valve turns on/off by the central processing unit Raspberry Pi to stop the water supply whenever the flow rate exceeds a predefined limit. It is proposed to employ an Internet of things for wireless communication so that the information can be passed to many responsible officer's cell phone for immediate action.**

**Keywords: Raspberry pi, Flow Sensor, Ultrasonic sensor**

ARTICLE INFO

**Article History**

Received: 11th April 2020

Received in revised form :

11th April 2020

Accepted: 13th April 2020

**Published online :**

**14th April 2020**

## 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.

Humans use a tremendous amount of water for tasks like gardening, showering, washing dishes and flushing the toilet. And while this use is part of the part of the earth's hydrologic cycle, overuse and leaky plumbing causes clean water to be squandered.

A leaky faucet may result in the loss of 10 gallons of water. Toilet bowl leaks can cause 60 gallons of water loss each day. Antiquated or loose shower heads dribbling water at a rate of 10 drips per minute results in a loss of 500 gallons of water yearly. Overwatering of lawns and gardens also wastes water. Correcting these issues may save consumers 10% on their water bills. We use about 27% of water for bathing and toilet use. Approximately, a leaking faucet can waste 4,000 drops of water, which is equal to a liter of water. A flush of the toilet uses six and a half gallons of water.On an average one person wastes about 0-45 liters water per day. To understand it better, it is 30% of water requirement per person per day. 125 million liters of water wasted daily. Approximately163 Million Indians don't have access to clean drinking water. 21% of the communicable diseases are linked to unsafe drinking water.

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 system, we solve all the above mention problems with automatic water level detection and refilling of water storage system with the help of raspberry pi controller.

## II. LITERATURE REVIEW

This paper presents a smart water management system using the microcontroller ZR16S08 as IoT solution, for water distribution support and loss prevention. The system operates through the smart monitoring of the water flow in pipes of the water distribution network, aiming to ensure the quality of the water supply, knowing that water losses characterize

 

one of the great problems in the world, as pipe holes may be open doors to water contaminants.[1]

In the era of IoT, automation is one of the essential attributes. This increases comfort and convenience in the lives of people. We would like to provide this in the domain of water management. Our motive is to help the readers understand the importance of using water judiciously and equipping them with the knowledge of the functioning of water management system which is done by using Internet of Things (IoT). We also discuss how this project is the future of sustainable management of water in residences.[2]

The provision of water of good quality and quantity is important to utilities in urban areas due to water scarcity and growth in demand. South Africa is a water scarce country and non-revenue water (NRW) is 37 % on average in the municipalities. Demand for water exceeds supply in Gauteng and the municipalities are the biggest consumers. The municipalities have developed Water Conservation/Water Demand Management (WC/WDM) strategies and this research study wanted to establish if these strategies are being implemented successfully or result in NRW reduction. It was also intended to establish if smart meter technology is utilized in the implementation of the WC/WDM strategies or if there is interest/will to use this technology by municipalities. The method of data collection that was used in this study was structured questionnaires that were prepared for the managers and engineers. The results indicated that there are strategies and policies in place for the WC/WDM implementations but it was concluded that these are on a small because the NRW remains high. The municipalities are aware of water problems facing the industry and the capabilities of smart metering technology. Prepayment metering is currently in use and smart metering technologies can be used in the future[3].

Water is a vital resource for life, and its management is a key issue nowadays. Information and communications technology systems for water control are currently facing interoperability problems due to the lack of support of standardization in monitor and control equipment. This problem affects various processes in water management, such as water consumption, distribution, system identification and equipment maintenance. OPC UA (Object Linking and Embedding for Process Control Unified Architecture) is a platform independent service-oriented architecture for the control of processes in the logistics and manufacturing sectors. Based on this standard we propose a smart water management model combining Internet of Things technologies with business processes coordination and decision support systems. We provide an architecture for sub-system interaction and a detailed description of the physical scenario in which we will test our implementation, allowing specific vendor equipment to be manageable and interoperable in the specific context of water management processes.[4]

Water is always a crucial part of everyday life. Due to global environmental situation, water management and conservation is vital for human survival. In recent times, there were huge needs of consumer based humanitarian projects that could be rapidly developed using Internet of Things (IoT) technology. In this paper, we propose an IoT based water monitoring system that measures water level in real-time. Our prototype is based on the idea that the level of the water can be very important parameter when it comes to the flood occurrences especially in disaster prone areas. A water level sensor is used to detect the desired parameter, and if the water level reaches the parameter, the signal will be fed in real- time to social networks like Twitter. A cloud server was configured as data repository. The measurement of the water levels are displayed in remote dashboard.[5]

This project focuses on monitoring of use of water, consider, by one block of houses in a flat system, where at the partition of pipeline from where the water gets diverted to various parts of a block.[6]

This paper presents an IOT device which help to manage and plan the usage of water. This system can be easily installed in residential societies. Sensors placed in the tank which continuously informs the water level at the current time. This information will be updated on the cloud and using an android application, user can visualize the water level on a Smartphone anywhere that is connected to the Internet. According to the level of water in the tank the motor functioning will be automatically controlled, at low level of water motor will automatically turn on and when tank is about to fill up it will cut off.[7]

## III. SYSTEM DESIGN

**Raspberry Pi 3 B+:**

Raspberry Pi 3 Model B+ was launched with a faster 1.4 GHz processor and a three-times faster gigabit Ethernet (throughput limited to ca. 300 Mbit/s by the internal USB 2.0 connection) or 2.4 / 5 GHz dual-band 802.11ac Wi-Fi (100 Mbit/s).[15] Other features are Power over Ethernet (PoE) (with the add-on PoE HAT), USB boot and network boot (an SD card is no longer required).

**Ultrasonic Sensor:**

This information is passed on to the central servers on a regular basis and also indicates the level of water is present in the reservoirs and tank.
Ultrasonic ranging module HC-SR04 provides 2cm-400cm non-contact measurement function, the ranging accuracy can reach to 3mm.If the level sensor are 4 pins echo, trigger, ground, Vin. The sensor can measure the level of water

**Flow Sensor:**

Effective water management involves supplying water according to real requirement and thus measuring water is vary essential step in water management system.
Flow sensor typically output a series of pulses proportional to the instantaneous flow rate which means that to interrupt them it necessary to implement a simple frequency component. Since this project use a water flow sensor containing hall –effect sensor that outputs a pulse rate proportional to flow rate. In this project used to the flow sensor to measure flow of water.

## IV. PROPOSED SYSTEM

 

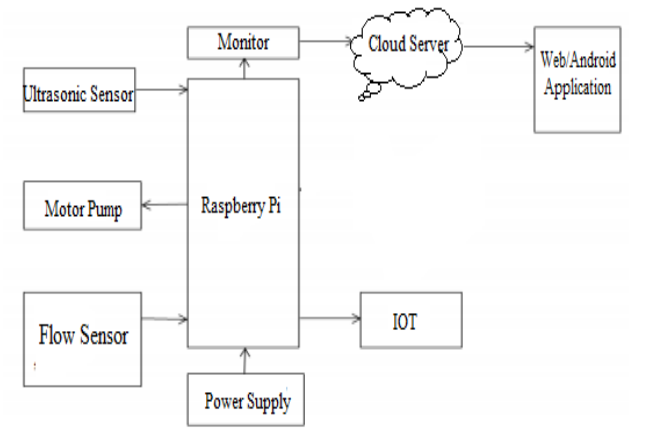


Figure 1 Proposed System

All the planned modules can be implemented by using Raspberry pi. Automated supply can be well executed by embedding all the details such as time and quantity to the raspberry pi module. Flow measurement on each channel can be easily measured by employing flow sensors. Voltage is produced when water flow through the sensor and by modulating the calculated value, flow can be easily found. All home units will not be consuming water evenly. Some may consume water quantity beyond the desired level which leads to scarcity among other home units. By measuring flow in all home units, the one with high water consumption can be easily found and over consumption alert is produced. To check the water level using ultrasonic sensors are used.
The proposed block diagram consists of different sensors like flow sensor, ultrasonic sensor and motor pump. Initially the raspberry pi connects to the internet. When the connection is established it will start reading the parameters of sensors which are connected to the controller. The threshold levels which are set in programing for the analysis the current required sensors. The sensor data are sent from android application to the server and stored in the global cloud. The coming sensor data can be analyzed based on decision tree classifier anywhere any time from android application. If the sensor values are greater than the set value i.e. threshold level then the respective notification will be sent to the user and the required action will be done for the controlling of the parameters.

It consists of the below modules:

1. Registration
Any user can register easily in our android application. In this system feature we will store all needed data of user, so that only authorized user can use application.

2. Authentication
Only registered users can use our system feature, so this authentication feature is very important step in our application.

3. Connect with Hardware
After authentication, by using our mobile app user can connect with controller to sense the sensors values.

4. Decision tree classifier

After fetching the all sensors values our system will classify the billing unit to the user based on how may water used by particular user using flow sensor.

## V. ACKNOWLEDGMENT

We would like to thank Prof. Ganesh Kadam for guidance and support. We will forever remain grateful for constant support and guidance extended by him, for the completion of paper.

## VI. CONCLUSION

An electronic system is designed to control and monitor the level of water in a tank. A similar reservoir based on the water detector sensor information. The electronic system is designed to automatically control and display water levels. The proposed system eliminates manual monitoring and controlling for home, agricultural or industrial users. The system achieves proper water management and enhances productivity from automation.

## REFERENCES

[1] Michel R. Machado, Tiago Ribas Júnior, Michele R. Silva, João B. Martins; “Smart Water Management System using Microcontroller ZR16S08 as IoT Solution”, 2019 IEEE 10th Latin American Symposium on Circuits & Systems (LASCAS),IEEE 18 March 2019

[2] Kaushik Gupta, Mandar Kulkarni, Manas Magdum, Yash Baldawa, Prof. Shivprasad Patil; “Smart Water Management in Housing Societies using IoT”; 2nd International Conference on Inventive Communication and Computational Technologies, April 2018

[3] Sayali Wadekar, Vinayak Vakare, Ramratan Prajapati, Shivam Yadav, Vijaypal Yadav; “Smart Water Management Using IOT”, IEEE 2016 5th International Conference on Wireless Networks and Embedded Systems (WECON), 27 July 2017

[4] Chanda Rajurkar, S R S Prabaharan, S. Muthulakshmi, “IoT based water management”, IEEE 2017 International Conference on Nextgen Electronic Technologies: Silicon to Software (ICNETS2), 16 October 2017

[5] Thinagaran Perumal, Md Nasir Sulaiman, Leong.C.Y; “Internet of Things (IoT) Enabled Water Monitoring System”, 2015 IEEE 4th Global Conference on Consumer Electronics (GCCE), 04 February 2016

[6] Toma´s Robles, Ramon Alcarria, Diego Martın, “An IoT based reference architecture for smart water management processes”, Journal of Wireless Mobile Networks, Ubiquitous Computing, and Dependable Applications (JOWUA), 31 March 2015

[7] Obby A Mesia, Louwrence Erasmus, “A study into the implementation of Water Conservation/Water Demand Management in Gauteng municipalities”,2013 Proceedings of PICMET '13: Technology Management in the IT-Driven Services (PICMET)(Publisher: IEEE), 21 October 2013

 