Smart Water Management System based on IOT

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Abstract

Now a days, lack of water resources is the major problem . According to Greenpeace report (July 2017), India is more water-starved nation, by 2050 India become the most populous country and having only 4 percent of total world's water resources. Overall rise in requirement of water has been a foremost dispute in front of the world. Importance should be given to organization and conservation of the resources. This paper focuses on IOT based design for organization and conservation of water supply and also measurement of water quality distributed all over the city or village. Quality can be measured with different type of sensors like pH sensor etc. Wastage of water can be measured with the help of flow sensor. Current water management system is human dependant and it requires human interference periodically making the system little bit inconvenient and less efficient. For the problems of existing system, collection of data can be done in real time with the help of different sensors.

IndexTerms – IOT, Water management, pH Sensor, Flow Sensor.

INTRODUCTION

For every living thing, water is the crucial thing for life. For human beings it the basis for life, wealth etc. For almost all human activities, we require water. The overall resources of water around the world are getting exhausted. This problem requires more attention as the resources of water are dependent on the nature and consumption of water is directly proportional to the population. Greenpeace report (July 2017), says about water consumption is that for India only 4 percent of total world's water resources are available and they are going to be consuming [1].

All the water management systems are subject to water losses. Although the water loss volume varies it can be actual or superficial. The burst pipes, leakages, fitting problems, problems in connections lead to the actual water losses. The connections which are illegal, erroneous meter readings, meters which are stopped, errors in billing are some of the examples of superficial water losses [2]. For identifying the causes of water losses, current working policy must be identified by the manager or the person responsible for the water management system. The network should be analyzed and causes of water losses should be identified through it. The challenge is that to fill the gap between the amount of water to be distributed and the water billing to the customers, it is called "Non-Revenue Water" (NRW) [2]. Quality of water is another thing which is not considered yet. To measure the quality different sensors can be used such as pH sensor, turbidity sensor, flow sensor, temperature sensor etc.

To guarantee the harmless drinking water distribution the quality of water must be analyzed in real time, keeping this in mind a new system has been proposed to check the quality of water economically and efficiently The system implements Internet of Things based smart water management. With the help of sensors quality of water can be measured.The rest of the paper is organized as follows: section II gives the literature review of the system, section III refers to the proposed system. Section IV gives the conclusion of the system.

LITERATURE REVIEW

The Water supply management for most of developing countries around the world has different prolems. Because of suddenly rise in water demand for resources of water many areas are facing the problem of water scarcity,specially dry areas. The challenges are because of low and poor water supply. Beacause of urbanization, there is rise in pressure for water supply therefore it leads to mismatch in supply and demand. Also other major challenges for developing countries are poorly managed network, infrastructure aging etc. [8].

The author R. R. Dighade [2] explained the challenges in water loss management, what are the problems in distribution of water, the author clearly mentioned about the water losses in developing and developed countries and also the NRW. Issues regarding water losses in developing countries, causes of water losses, how the reduction of NRW can be done is also discussed by author.In 2014, Tomas Robel [3] proposed the model for smart water management, in which author discussed about the MEGA mode for smart water management which includes three main elements one Water Management Model and two interfaces Common Communication Interface and Coordination-Subsystems (C-S) Interface. The water management model consists of physical model and the process model. The physical model is implemented with standards EN 61512 and EN 62264. The physical model includes Company, Location and area. The process model refers to the different methods which are required for management of water subsystems some of them are water irrigation, filling of tank, measurement of water consumption.

Common Communication Interface is a set of web services which is used by applications to gather all the essential information so as to regulate the water consumption and then it is sent to the water management operations which are going to be executed.

The coordination-subsystems (C-S) interface is used for service request and responses.

Vaishnavi V. Daigavane [4], in the year 2017 proposed different sensors which are connected to core controller. The core controller then accesses the values from sensors and processes them for transmission of data via internet. Internet wi-fi system is used to view the data collected from sensor and for this system core controller is Ardunio. The sensor data can be viewed on the internet wi-fi system. Mohammed Shahanas.K [5] proposed a system which consists of three modules point of use, Echo Module and data processing and integration module. Different sensors are placed at Point of use (POUs) with the help of Arduino and Bluetooth devices (BLE) for collection of information. BLE is used in case when the wi-fi is not in range. BLE with Arduino is treated as hop. The receiving module, the push module is used to store the data at local server. In data processing and integration module the information is fetched from the local server and then it is placed to central server for further processing. Smart water management system is a part of smart city. In [6] author discussed the system which is part of smart city and implemented on water tanks by measuring the quality of water and flow of water. If the pH level and conductivity is ok then only water will be distributed otherwise the water will not be distributed and the valves will be off.

In 2017, SreekanthNarendran, PreejaPradeep, ManeeshaVinodini Ramesh [7] reached out to underserved communities facing water scarcity and they have come up with a vital system that automates the functions.

PROPOSED SYSTEM:

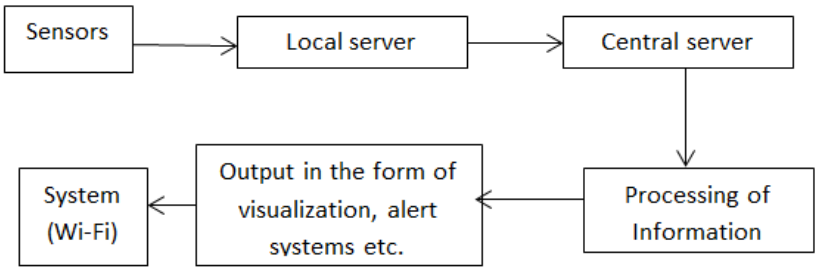

Fig. 1 Architecture of Proposed system

The proposed system consists of diffferent sensors such as pH sensor, Conductivity sensor, Temperature sensor and flow sensor.

pH sensor is used to measure the pH level present in water. Normally the pH level 7 is used. If it is less than 7 it is acidic and above 7 it is basic.

Dirtiness of water is measured with turbidity. It indicates extent to which water losses its quality that is transparency. It increases the surface water temperature beyond the normal temperature because the absorption of heat from sunlight is done by the particles near the surface. Temperature sensor is used to check the temperature of water. Flow of water can be measured with the help of flow sensor.

Sensors are placed at different locations. The information from sensors is fetched to local servers. Local server then sends these recorded parameters to the central server. Central server processes the information like what is the value for pH sensor, what is turbidity measurement etc. Accordingly output is given in the form of visualization alert system or alarm system with the help of Wi-Fi connection. Flow sensor can be used to measure the flow of water through the system and by measuring flow of water water distribution will be easy. As the amount of water has been distributed by the system the valve for particular area will be automatically turn off.

CONCLUSION

As the quality of water and water losses are the major problem problems in water distribution system. The proposed system with the help of pH sensor, temperature sensor and flow sensor the syste can automatically checks the water quality. Current system requires human intervention for distribution of water as open the valve for particular area after some amount of time again go to close the valve. In proposed system human interference is not require periodically for the system. Flow sensor is used to calculate amount of water flow through the system. Which in turns automatically turns the water valve ON or OFF. The systm can be more efficient as the water quality can be measured quickly.

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