

# Water usage control and management based on IoT

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## ABSTRACT

Water is the most important factor that contributes to the survival as well as the well-being of mankind. Keeping in mind the current scenario, a lot of water is used by household even in places where less water can work. This in turn leads to shortage of water making water cut necessary. The water bill that every owner receives is a constant one included in Maintenance Bill. Our idea is to detect the usage of water by individual flats and bill them accordingly using IOT sensors. Also the owner will be kept updated in real time about their water usage via an android app. Thus they can track their usage and avoid wastage of water to reduce their bill. Another advantage of the real time water usage tracking would be that if in case some tap is left open by mistake for a longer time than usual the sensor would sense a continuous water flow and send an alert to the mobile application. This would avoid unnecessary wastage of water. It will also provide a internet-enabled locking mechanism in the main source pipe which can be turned ON/OFF remotely from the android app. Thus in scenarios where water tap is left open by mistakely while leaving the house, an excess continuous water flow would trigger an alert in the app thus making the owner aware of the situation and he/she can turn the source pipe off from the mobile application. Also the water quality information would be updated in app so as to ensure better health of the residents.

**Keywords:** Water Management, Flow sensor, Ultrasonic Sensor, Solenoid Valve Sensor, Wifi-Module, Notification.

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## I. INTRODUCTION

Water is an important resource for all the living things on the earth. Water Scarcity is the most common problem faced by the people of India. This happens mainly due to less available Supply and more people using it. Water consumption needs to be minimized to required amount and not wasted unnecessarily. A lot of extra water is used by the household where less water can be sufficient. Every flat in any given society gets equal amount of bill which is not based on usage. Here in this project, we propose a system which keeps a track of water usage and generate bill accordingly. Also we have added real time water tracking which can be traced using an android application and the source can also be turned off using the application.

## II. PROBLEM STATEMENT

Our world and community is facing excessive water usage either for domestic or commercial purposes. Water shortages or scarcity may be caused by the current climate change, such as altered weather-patterns, increased pollution, and increased human demand and overuse of water. Now days in India water distribution and management is not proper, also billing system is not available properly. In this system we proposed automation instead of manual water management.

## III. LITERATURE SURVEY

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 utilised 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]

#### IV. BLOCK DIAGRAM

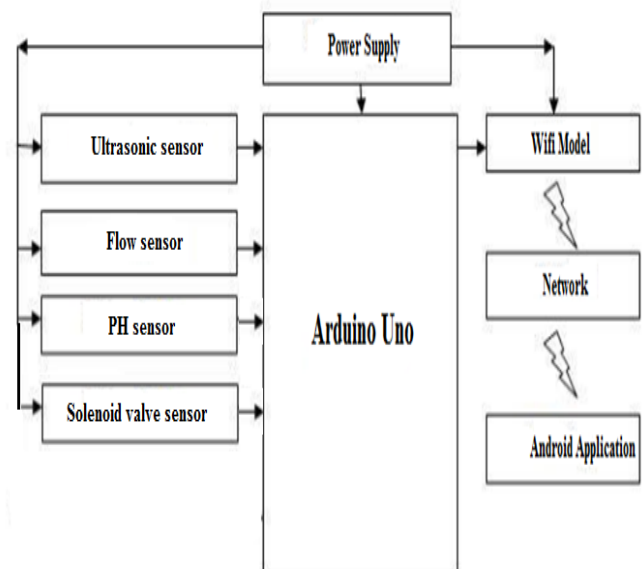


Fig 1. System Block Diagram

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
- Solenoid valve

## V. 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

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

$f1 = \text{QUANTITY}(n, I1)$

$f2 = \text{FLOW\_RATE}(I2, I3, O2)$

$f3 = \text{CONNECT}()$

$f4 = \text{REP\_GEN}(f1, f2)$

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

## VI. CONCLUSION

An electronic water management system for flats and apartments is designed to control and monitor the usage of water by a single flat. The bill of water is generated according to the usage. The system is designed to automatically display as well as control the water flow. The proposed system eliminates manual monitoring and controlling for domestic users. The system achieves proper water management and enhances productivity with the help of automation.

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