

# Water Consumption and Water Leakage Alert Using IoT

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## ABSTRACT

Managing water consumption is important for life preservation. Knowing water consumption at homes can have a great impact on water saving. There is a global water crisis due to increasing population growth, climate change, increasing consumption. Giving a report about the state of the planet's water, especially in developing countries, the report describes the outlook for future generations as worries. To visually check water taps in the house consumes time and requires a family member to be at the house. To remotely do so, we propose a system that monitors, alerts the user and allows the user to control the water flow through taps whenever there is an unusual reading of the water usage at home. The Water Flow Monitoring and Controlling System is an android-based mobile application. It is equipped with external hardware to sense a tap's water flow rate and control which means turning on or off the water supply line whenever necessary. Registered users can login and view their house's current water flowage from the mobile application. The external hardware updates the water flow rate at every specified time to a database through the Internet connection. If the users decide to turn on or off the water supply taps at their homes, it can be done through the on or off button provided in the mobile application. A user's on or off instruction is set within the database. The hardware receives this instruction and performs the desired action.

**Keywords :** Water Leakage, IoT, Monitoring and Controlling System, Servo Motor, Mobile Application, NodeMCU, Firebase Cloud, Tap Water Flow

## I. INTRODUCTION

The main objective of the project is to develop a water consumption maintaining application using Internet of Things. To visually check water taps in the house consumes time and requires a family member to be at the house. To remotely do so, we propose a system that monitors, alerts the user and allows the user to control the water flow whenever there is an unusual reading of the water usage at home. This System is an android-based mobile application. It is equipped with external hardware to sense a tap's water flow rate and control (turning on or off the water supply line whenever necessary). Users can login and view their house's current water

flowage from the mobile application. The external hardware updates the water flow rate to a database through the Internet connection.

## II. LITERATURE SURVEY

### 2.1 OVERVIEW OF THE EXISTING SYSTEM

In Presently, water usage is recorded by the water flow meter that is installed at every home. The readings recorded by the meter is manually collected every month and a bill is generated. Customer pays the bill amount in the water supply board. The current system is simple but can be recreated so that the water usage monitoring can take care of unknown leaks and wastage of water.

In case of pipe breakdown or leakages, water is wasted until the respective authorities get to know that the leak has occurred. Also, customers cannot keep track of their usage or get notifications when their metered range is crossed. As and how the requirements increase, the overall system should be changed to meet all the requirements.

## 2.2 SURVEY

Many researches are going on in the field of IoT and its applications. One such application is Smart Water Management. Many researchers target on creating a system which can indicate level of water in tanks [1] while others target on monitoring quality parameters of water such as pH, turbidity, etc [2]. Only few targets on monitoring both water level as well as the quantity parameters. Another work presented [3,4] present an Internet of Things system which is capable of detecting and displaying level of water in the storage tanks and used for managing and planning use of the water. This system makes use of single stranded wires as water level sensors can display 4 levels of as extremely low, low, medium and high. Their project provides the facility to visualize as well as remotely monitor through a smartphone application. System will not be providing provisions for higher quality parameters like Turbidity and pH monitoring. The system proposed by Rajurkar et al in [5] focuses on monitoring of water considering a flat system. This system proposed use of water flow sensor to calculate amount of incoming and outgoing water. Water flow readings are collected and visualized in graphical form with help of water flow sensors, Arduino board and cloud computing. This system does not provide provision for monitoring exact level of water Work presented in [6] used sensors for monitoring flow of the water in between pipes as well as to monitor the water source.

## III. PROPOSED SYSTEM

The aim of the project is to create a water usage monitoring system that provides uninterrupted water flow monitoring, controlling and leakage detection in pipes. For this flow meters are installed at different nodes to record the readings of water usage. These readings will be sent to microcontroller. A Wi-Fi/LAN module is used to store these readings on Firebase cloud. Mobile app communicates with cloud and can provide users an access to their usage data in a graphical form. User of each apartment is given login credentials to view their monthly/weekly/daily usage, estimated cost, etc. Users can be notified when usage exceeds each range. Also, leakage can be detected by comparing the readings of flow meters on the same line of pipe connection. Also, immediate actions can be taken whenever leakage occurs by notifying it to the respective authorities. Proposed system can improve the existing system by implementing most of the useful requirements so that wastage of water is reduced. Moreover, users can track their water usage with user friendly applications.

### 3.1 NEED FOR PROPOSED SYSTEM

In this project we show how to make a water flow controller with microcontroller and servomotor which will use as a switch gate. The servo motor in this project is used to control water flow and the sensor is used to measure the water level. By this project we can control the waste of water and by using it on the switch gate we can prevent flood, or any other water related problems. This project can be used in industry as well as household. This project has two functions, one is water measure, and another is flow control. By combining these two properties we can control water stages in water treatment plant, switch gates of small river, canal or lake. So, this control system gives safe secured water flow control. In short, the purpose of the project is to design a smart water flow control system, to construct a smart

water flow controller circuit in the breadboard, test for its functionality, product commercialization.

### 3.2 TECHNIQUE/TOOLS

NodeMCU:

It is used as a microcontroller to control all other components. This is used for transmitting and receiving the data.

Firebase Cloud:

It is used as a backend process for connecting the IoT system and mobile application. It receives, stores and transmits data between the hardware and software.

Water flow sensor and ultrasonic sensor:

An overall reading of the flow rate of water is displayed. A water flow sensor is used to send the reading to microcontroller and the water level is detected by an ultrasonic sensor. This includes the output of rate of flow of water, water level with current time and date.

Servo motor:

If the user wants to turn on or off the water flow, they can do it through the mobile application. The application send the request to the microcontroller which send the information to servo motor. The servo motor rotates the degree to control the flow and does the specified operation in the water monitoring system

## IV. IMPLEMENTATION

The implementation phase of water monitoring system includes the following modules:

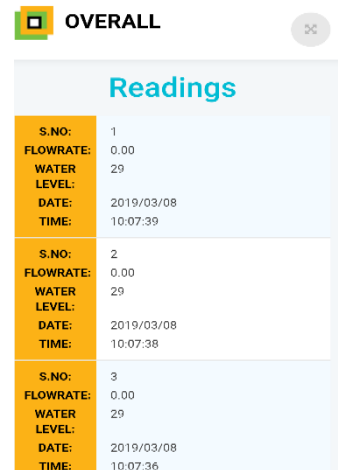


Figure.1

The module (figure.1) displays the readings which includes the readings of the water flow rate, water level along with the date and the time of the readings.

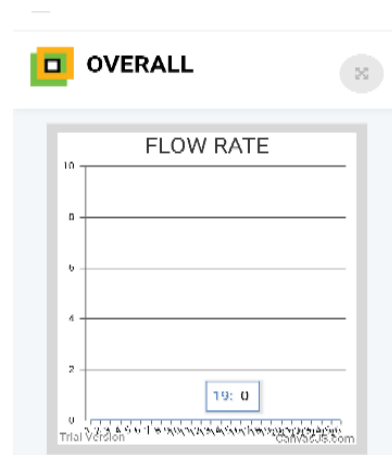


Figure.2

The module (figure.2) gives an overall presentation about the flow rate in chart format.

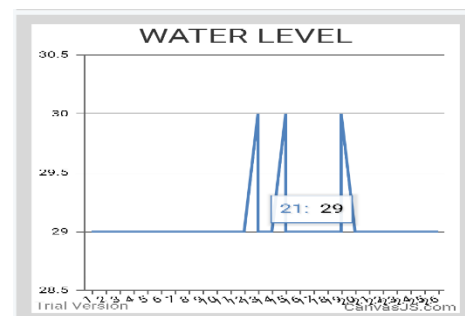


Figure.3

The above module (figure.3) gives an overall presentation about the current water level in chart format.

## V. CONCLUSION

In this paper, we develop an online mobile app that monitors and controls the water flow through taps whenever there is an unusual reading of the water usage at home. The developed App enables a user in monitoring and controlling the water flow at home via an online mobile application's (app) graphical user interface (GUI). This makes the monitoring process more efficient and convenient for house owners. In the future work, we shall develop an agent-based system that monitors the water flow and autonomously take measurements on behalf of homeowner whenever there is an unusual reading. The agent will be embedded in the external hardware.

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