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# Water Usage Analysis Using Water Flow Sensor

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**Abstract:** ***Water wastage is a worldwide issue. It needs constant monitoring to avoid water waste. One of the reasons for this is the public and administration are oblivious of what is going on. There are several types of water monitoring systems available, but they all require manual operation. The proper management of water is the focus of this project. The project's goal is to create a smart system for water discharge management and monitoring. The system is controlled by Node MCU and allows water to flow out of the pipe in a regulated manner. The quantity of water 'q' to be released and the time 't' to perform this duty must be input into the system through a keypad and shown on the LCD screen coupled to Arduino at the transmitter end. The data is wirelessly delivered to the Node MCU, which is located at the receiving end. The information obtained is compared to the code written in Arduino programming. The water flow sensor is connected to the Node MCU, and the needed amount of water is forced to flow through the pipe according to the code. The data is then sent to a cloud based dashboard where user can see the required details. This proposed system can effectively solve the problem of water discharge regulation.***

**Keywords:** Node MCU, Flow Sensor, Monitoring, Cloud

## 1. Introduction

Controlling water use is essential for maintaining life. Understanding household water usage may significantly improve water conservation. Even households might alter their spending patterns. There is an approaching worldwide water catastrophe, according to reports, caused by rapid population expansion, climate change, careless consumption, and persistent waste. The research gives a sombre assessment of the condition of freshwater on the world, particularly in emerging nations, and calls the prospects for future generations worrying. However, it takes time, is laborious, and necessitates that a family member be there to visually inspect each water tap in the house. We suggest a system that, whenever there is an odd reading of the water use at home, monitors and regulates the water flow through taps in order to accomplish this remotely. An interactive web-based solution called the Water Flow Monitoring and Controlling System can assist users in tracking daily water consumption and establishing water usage caps. The user may also set a cap on the water flow or volume.

## 2. Literature Survey

Kuganesan Kumar, and Moamin A. Mahmoud [1] proposed in this paper, that they have developed an online mobile app that monitors and controls the water flow through taps whenever there is an unusual reading of water usage at home. The developed App enables a user in monitoring and controls 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. Rasin, Z.; Hamzah, H.; Aras, M.S.M [2] resolves the problem of the manual analytical method Adopted in water flow detection with bad real-time character, this paper introduces a remote Water flow measuring and monitoring system. To accomplish the water quality parameter remote probing and real-time monitoring of the Smart water flow control and monitoring system 2017-2018, employed a wireless sensor network based on the ZigBee protocol. Mohd Rizal Abdullah [3] and Zulhani Rasin This study uses an application that is expressly designed for wireless networks, namely a water equitable distribution and monitoring system. A viable communication system for fair water distribution and quality monitoring is given, as well as a description of our channel measuring technique. The microcontroller for the automated Water level monitor with feedback, Ejio for VirginiaEbere, Oladipo Onaolapo Francisca [4], has passed her essential testing with the other components interfaced with it, and it is now available. Without the need for human interaction, this system can monitor the water level in an above tank, turn on the water pump when the tank is empty, and turn off the same pump when the tank is filled. Water waste and sudden water supply cuts are both reduced as a result of this action. A.Sivasankari, T.Deepiga [5]. The goal of this research is to create a water monitoring system based on a wireless sensor network (WSN). Water level monitoring, water pollution monitoring, and water pipeline leakage monitoring are three different types of water monitoring.

## 3. Problem Definition

Water waste is a global problem. To prevent water waste, it has to be constantly monitored. Creating a system to collect, analyse, and provide useful data on the flow, pressure, and distribution of water supply while giving the user a dashboard.

## 4. Methodology

Figure 1. Illustrates the Flow chart of the whole proposed system. The circuit diagram for the proposed system is illustrated in Figure 2. The Water flow sensor illustrated in Figure 3.measures the amount of flow that is being passed through it. The data is then sent to the Node MCU illustrated in Figure 4 which is an open source platform based on ESP8266 which can connect objects and let data transfer using the Wi-Fi protocol. The rotor inside the flow sensor turns as a result of the water flowing through it. The rotors movement generates pulses that are sent to the Node MCU. The Node MCU will use these pulses as an interrupt signal. The count of the flow frequency variable will rise one for each interrupt signal (rising edge). The moment right now and clop Time variable makes sure that the value of the flow frequency is taken every second to calculate the flow rate and volume. The flow frequency variable is set to zero when the computation is complete, and the process is then repeated from the beginning. The output from the Node MCU is sent to the localhost website on which a dashboard is present. The dashboard contains the information about the current water flow rate and the total amount of water that is being used. This data can be seen on the user portal as illustrated in Figure 7. The basic view of the dashboard is illustrated in Figure 6. This project can effectively solve the problem of water discharge regulation.

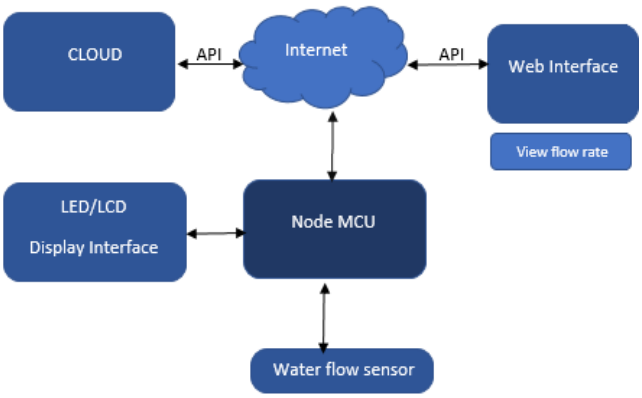


**Figure 1:** Flow Chart

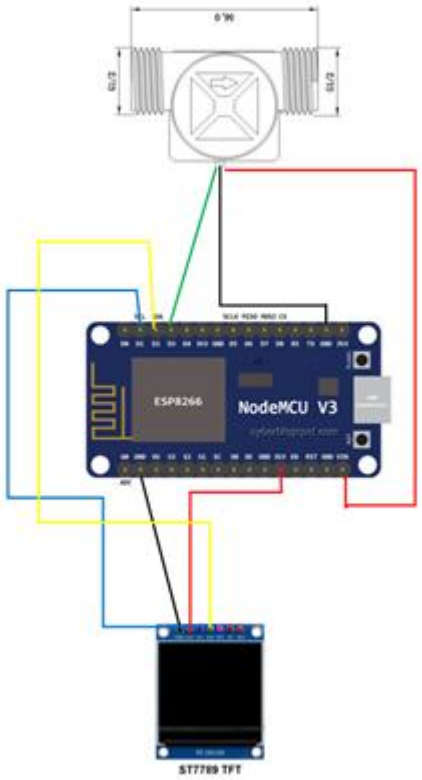


**Figure 2:** Circuit Diagram


**Figure 3:** Flow Sensor

**Figure 4:** Node MCU

$$Pulse\ \ frequency\ (Hz) = 7.5\ X\ Q$$

Where,

Q is flow rate in Liter/ minute

$$\text{Flow Rate } \left(\frac{1}{h}\right) = \frac{Pulse\ \ frequency\ \ X\ 60\ min}{7.5\ X\ Q}$$

In other words:

*Sensor frequency (Hz) = 7.5 X Q l/m*

$$liters = \frac{Q\ X\ time\ elapsed}{60s/min}$$

$$liters = \frac{Frequency\ X\ (pulse/sec)}{7.5} X \frac{time\ elapsed(sec)}{60}$$

$$liters = \frac{Pulses}{7.5\ X\ 60}$$

**Figure 5:** Pulse to flow rate calculation

## 5. Results and Discussion

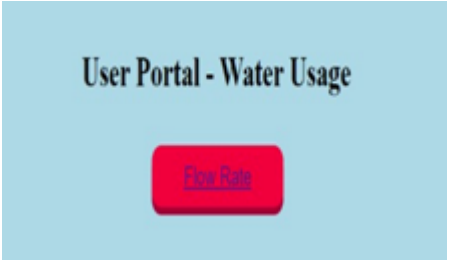


**Figure 6:** User Portal – Water Usage

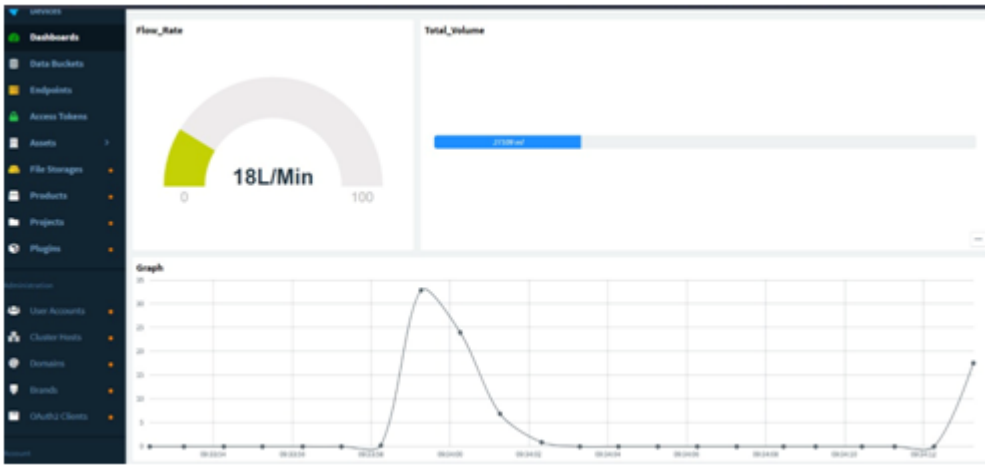


**Figure 7:** User Dashboard

The research has been effective in automatically tracking the volume and flow of water. So, we can measure how much clean water we consume everyday.

## 6. Conclusions

In the proposed system a Water flow Sensor based User Analysis System is developed that can automatically control the flow of water in societies and cities. This project is a low-cost, and its efficiency is higher than the existing approaches. The flow of water is automatically controlled and monitored using this project. As a result, the necessary amount of water is distributed to each household on a daily basis and the consumer can keep a track of the water that is used. In the case of any fluid in the industry, the same process may be used. The prior methods' drawback of requiring people has been abolished. This real-time project is a solution for easy and automatic water management, which helps to reduce water waste.

## 7. Future Scope

There is no restriction on water usage in Asian countries especially in India, Due to this, resources of fresh water are decreasing day by day, and ground water depth is increasing day by day. According to a survey, India adds in the list of water scarcity zone in 2025. If the problem of water shortage is taken seriously, the government might also think of installing water utility systems in future. The proposed system can be converted to water utility machine by doing some slight modifications. Also, cloud features are planned to be introduced which would maintain a seamless connectivity between the device and the user over long distances. Further, to make people more aware of water usage and its importance, a reward system can be added and rewards can be given to people who have maintained a good score.

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