



IOT Based Smart Fluid Flow Meter

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ABSTRACT

Water is a key concern, especially in drought-affected countries, and hence water management is critical. Water distribution and pricing are the most important business aspects of water management for consumers. In metropolitan areas, municipal officials manually assess water use using a meter installed on each individual. For gated communities or huge apartment complexes, water usage charges are evenly distributed over the whole occupancy of the dwelling. The occupants' consumption expenses should be priced volumetrically rather than in equal amounts. This study offers an Internet of Things-based smart water meter reading system that detects water consumption at specific blocks in gated communities/apartment complexes and calculates volumetric pricing. This information is subsequently transferred to cloud platforms for monitoring. Water conservation can also be accomplished by usage monitoring.

While many studies have recommended creating an IoT-based smart meter system, there has been insufficient research on the IOT sensor node, particularly on battery life. This work seeks to design and analysis an efficient data gathering technique for IOT-based smart metering applications, taking into account energy usage. The system components include Arduino Uno, Wi-Fi-ESP8266, and water flow sensors.

INTRODUCTION

Across the various cities and town, the supply of water has been a major problem as the demand of the water depends on various consumption factors and water distributors have to maintain the water supply in real-time to fill the gap between demand and supply. But, the challenge is to calculate the consumption trend. Various methods like keeping track of water consumption, not wasting water and detecting the overconsumption of water have been practiced a lot to reduce the water consumption around the cities. Fortunately, Smart Water Meters have been providing the perfect solution for water distributors and consumers to meet the volatile demand for water.

Many companies have been coming up with advanced solutions using Smart Water Meters to track water usage of individual houses to avoid wastage. With the installation of IoT Smart Water Meters, residents nowadays can track their exact water usage by following a pay-as-you-use system. Not only this, with more and more innovative technologies residents now have become more aware of their usage and are deliberately trying to reduce the wastage. By using an App on their Smartphones, residents can also control the water flow like managing the water connection and turning the valve off in case of any leakage.

PROBLEM STATEMENT

With growing pressure to conserve limited water resources, smart metering provides the utilities with the opportunity to streamline their water distribution processes through data-driven decisions. The smart water metering enables the utilities to automatically collect consumption data, eliminate manual meter reading, improve efficiency and save costs. It also provides an opportunity to detect leaks and abnormal consumption more efficiently than the manual methods.

A typical smart system relies on electronic sensors and bidirectional communication networks to remotely read, store, and transfer data for analysis and feedback. The transmitter attached to the water meter uploads the consumption data to the processing server for analysis, billing, and other processes. Usually, the automated meter reading and transmission frequency is flexible and can be daily, hourly, real-time, etc.

As more utility companies transition from the conventional manual meter reading practices, they are increasingly adopting Automated Meter Reading (AMR) and Advanced Metering Infrastructure to automate the reading and billing processes.

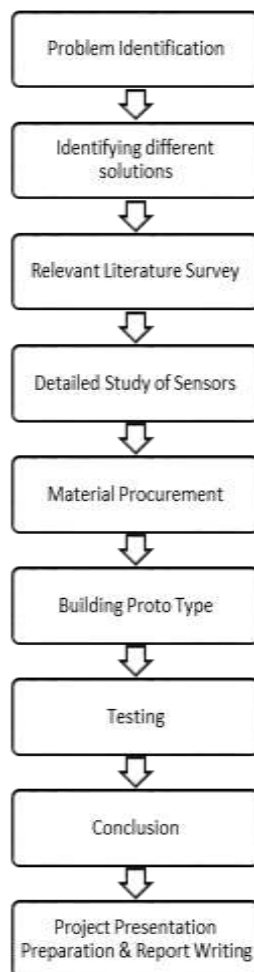
LETRATURE REVIEW

The current supply of water is continuous, i.e. we can use the water as much as we want. Due to which the wastage is also more. Because of the usage is more, till the month of march or april the water supply to user is less because of the lack of water in the dams etc. Due to the shortage of water the current measures taken by the municipal corporation is to reduce the time duration of water supply and to reduce the pressure of the water. The shortage is due to improper measure and distribution of water is taken place from distribution center and no measures are taken place by household work before use. The current situation is the estimated water usage does not meet the actual water usage. The estimated value is we can calculate the census of the people in the area and can allot particular amount of water for per person. But the actual usage of water is more than the estimated value. To avoid such situation and to prevent the water for future use we need to take some precaution and reduce the wastage of water. This system will help to decrease the wastage of water by giving per person a required amount of water.

In this process we are giving some constant value of water in a liter. If in a home there are n numbers of members then the constant value we have multiplied by the n number of members. The initial value or set point is set in the microcontroller for each home. After the set point is reached then the water supply will cut off. If we need more water supply due to some condition or some guests have come then we can send the signal by pressing the required amount of water in keypad and the signal is sent through the zigbee. Return signal will come if the water distribution area is allowing. There are two section in this system, remote(user) section and the control(water distribution center) section. In remote section flow of water to the home is carried out. The flow meter will sense the flow to water. And it is passed to the user through the electric solenoid valve. Flow meter is given to the PIC microcontroller.

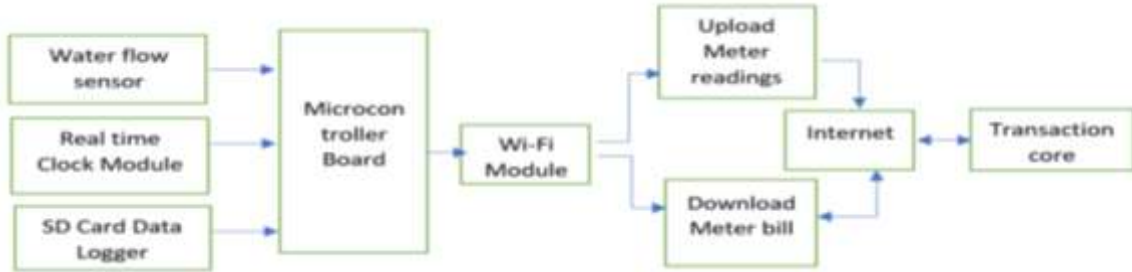
The set point is given to this system is 1 liter. So after 1 liter of water is passed through the flow meter the valve will automatically shut off. Water flow sensor will pass the signal to microcontroller in pulse form. Water level sensor is also placed in tank to indicate the level of water. There are three levels used high level, middle level, low level which is used for the simplicity of user. If more water is needed then the amount of water in liter are pressed on the keypad. If we need 5litre extra then key number 5 is pressed and # key is pressed to pass the signal.

PROPOSED METHODOLOGY AND OPERATING PRINCIPLE



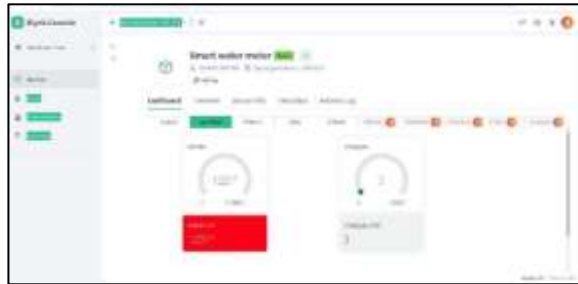
WORKING PRINCIPLE

In this project, the proposed system aims to design an IoT based smart water meter to monitor water consumption, taking into account the energy consumption of IoT sensor nodes. The suggested solution integrates a smart meter and Arduino Uno with the ESP8266 Wi-Fi module to address diverse scenarios. The water flow sensor YF201B measures water use. When water runs through the sensor, the magnetic rotor rotates at a variable rate based on the flow rate. Sensing data will be transmitted to the IoT-Fusion center via ESP8266 WiFi



RESULT AND DISCUSSION

Trial no.1 (Actual discharge showed vs measured)



Result table:

Discharged measured by meter on screen	Discharge result showed by IOT	Remark on result
1229 ml	1229 ml	Accurate

Trial No.2 (Actual discharge showed vs measured)



Result table:

Discharged measured by meter on screen	Discharge result showed by IOT	Remark on result
2154 ml	2154 ml	Accurate

CONCLUSION

In conclusion, smart water meters are not just about monitoring water usage; they are about optimizing it. The investment in this technology is a smart one, ensuring that you reap substantial benefits in terms of cost savings, accurate water data, water conservation, and a more sustainable future.

FUTURE SCOPE

The Smart Water Meters market is projected to experience a remarkable Compound Annual Growth Rate (CAGR) between 2024 and 2032, resulting in a substantial increase in revenue to multimillion USD by 2032 compared to the figures in 2022.

REFERANCE

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