Automatic Timer Based Corporation Water Supply with GSM Alert and Algae Prevention System

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Abstract - Water is being a basic necessity for the existence of life on this planet. In the existing system, water management system exists with a supply of water from panchayat to a group of people or village in a particular time period which is unknown and therefore it may cause a discomfort for the people to get water if they are unavailable at that time. In the proposed system, it aims to develop a water management system in which an automatic GSM alert is used to intimate the time of supply of water to a particular region priorly and also an ultrasonic algae prevention system is attached with it the main tank to prevent the algae formation. In the part of automatic GSM alert, the water supply will be notified to an individual through their mobile which makes them aware of time of supply and avoids the limitations of the existing system. Ultrasonic algae prevention system is based on the proven fact that ultrasonic braves prevents the formation of molecules from an atom which is the major reason for the algae formation in tank so that ultrasonic sensor is used to pass waves at regular intervals to avoid formation of algae in the water tank.

Keywords - Water tank, Algae prevention, Water distribution

1. Introduction
Water is being an essential entity for the survival of life in earth. Water supply management plays a major role as the people all around the country should be distributed with the adequate amount of water that they want for their day-to-day activities. According to the survey of data collected, it is being seen that nearly 135 -196 liters of water per day is used for domestic purpose. In present days, water supply management runs based on the random schedule to distribute water to different streets. People need to wait for long time and wasting their time by expecting water supply. Predicting the water supply is not possible here due to the man power and due to insufficiency of water in main tank. This causes a discomfort for the people to make themselves available on the particular date of water supply.

The automatic timer-based corporation water supply with GSM alert and Algae prevention system is an improved version of water management system by including an alert system for the people to indicate the time of supply of water in their region and to avoid the algae formation in the water tank as it may cause some health hazards to the people consuming it. This paper proposed a system is to intimate the supply of water to the consumers through alert message at least one day before based on the availability of water in main tank and the number of houses in the street. Algae prevention system is also added to prevent the algae formation in the inner walls of tank due to the stagnant water by using ultrasonic waves.

2. Literature Survey
[1] Discussed an IOT based water management system to maximize the usage of water and to minimize the wastage. According to this paper, water is being partitioned for individual blocks or apartments by fixing water flow monitoring sensors at the pipes of each block the consumption of water can be calculated and the data will be uploaded in cloud through IOT. The corresponding person of the house will be intimated about the over usage of water limit as set by the government and extra fares are charged based on the consumed amount of water. Through the data uploaded in the cloud the statistics of water usage on each season is concluded. This is being introduced on the advice of Intergovernmental panel on Climate Change (IPCC).

[2] have dealt with the design of water distribution system using EPANET. This system is designed with the EPANET software to extend the duration of hydraulic movement simulation and the quality of water in pipe under pressure in a network which consists of pipes, valves, tanks, reservoirs, pumps, and nodes. EPANET is programmed in such a way to collect data such as the measure of chemical species, flow of water in all pipes, tank’s height, pressure available in all node in all the networks in the duration of simulation. In addition to the measurement of chemical species, tracing of sources and the age of water can also be absorbed. EPANET is a software-based tool to observe and understand the mobility and faults in the constituents of drinking water in the water distribution system. This system can be used for various water distribution analysis such as measure of chlorine residual, assessment and efficiency of consumer exposure, calibrating the hydraulic system.

[3] proposed an electronically controlled water flow resistor to reduce domestic wastage of water. It provides the basic study in order to introduce a water management system planned to be installed in every house’s inlet. The water flow in the outlet will be automatically decreased depending on the usage of water in main tank. When the
main tank’s water usage reaches its high value, it is monitored by a flow sensor, the outlet water flow decreases. This is done by a microcontroller programmed to control the flow of water by using a solenoid electro-valve. The implementation of this system avoids the scarcity of water across the globe to better extent.

[4] discussed an optimization method of water supply based on SCADA system. This system is designed to calculate the quality and quantity parameters of water with an on-time alert and provides reaction. Possible solution for this system is implemented using a Real-time measuring industrial SCADA system which monitors the physical, chemical and biological parameters and helps in finding the system’s deviation. This data is saved and used for further analysis. This system became the major part in operational management systems and controls the supply of water.

[5] designed a water management system to measure pressure, pH level and leakage of water in the system. The hardware system consists of a leakage identification system, pH sensor and pressure sensor interfaced with the microcontroller. The input signals from the sensors are processed and the output signal is sent through wireless transmission module to the computer. Based on the output signal from the microcontroller, errors like leakage of water, burst of pipe, hazardous pH level of available in real time situation and the location of water leakage can be identified.

[6] proposed a faucet add-on water supply management system using smart sensors to fix a limit for consumption of water used each day. There are two modes of operations in the design such as running and filling associated with faucet. When the water dispenses the optimum level, the pre-alarm is set. The embedded algorithm integrates functions which includes acquisition and management of data in microcontroller which computes and compares the quantity of water dispenses through flow sensor.

[7] proposed an automated water usage monitoring system for controlling the unnecessary usage and wastage of water in domestic and industrial areas using LabVIEW software and Wireless sensor nodes. Water pipe outlets have sensor nodes to monitor the flow of water flowing abundantly to one particular region and lack of water to another region. IOT based concept is utilized to monitor the sensor nodes continuously to sense the flow of water. The server helps in tracking the usage of water whether it is over usage or unavailability of water. If the water is used abundantly by the user, it intimates the user with an alert message and lack of water supply is also monitored frequently. This design helps in tracking of water bills, to manage and balance the supply of water, modify billing scheme depending on usage [8].

3. Methodology

Proposed work
Automatic timer-based corporation water supply with GSM alert and algae prevention system takes up a major part in managing the water distribution system with two main features. One is the time of supply of water which is very essential for consumers is intimated through SMS alert based on the amount of water in the main tank and the number of houses in the street. The second one is the formation of algae on the surface of the water by continuously passing the ultrasonic waves in the water.

GSM alert system
Water is supplied to a particular street within the specified time. People can fetch water as much as they need within that time of supply. In this proposed system multiple sensors are placed in main tank based on the capacity. From these sensors data, this system will calculate the water level in the main tank. If the water level is sufficient for watering at least one street then the main tank level will be given to the microcontroller. Also, water capacity needed for an individual street and the last date of water supply to that street will be given as input to the microcontroller.

The purpose of microcontroller is to compare the main tank level with the water capacity needed for all streets. If it is not sufficient, then the street recently watered will be removed from the total list and it will be compared. This process will continue till the water level is sufficient for watering the streets at the maximum. The priority is set to the street which received water long since. After finding the street which may be watered, the houses in that street will get an SMS alert by informing them the time of water supply. At that particular time, timer will be switched ON and the corresponding pump will be switched ON. Once the water supply gets over to the stipulated time period set to the street, timer is disabled and pump will be switched OFF. Then the data regarding the street which gets water recently will be updated as input to the microcontroller. The next street gets the alert SMS message as soon as the valves of the first street have got closed also if the water is available in the main tank. The flow chart and block diagram of this entire process is given in Figure 1 and Figure 2.

This system is programmed by assigning PORTD to LCD display and RC6 (TX) and RC7(RX) of PORTC (data transmission port). The RX and TX of RS232 is connected to the TX and RX of MAX232 respectively which in turn connected to the data transmission port of PIC16F878A. When the level sensor (RB7=1) is high, the controller sends the alert SMS through GSM module (SIM900) to the people of the street

Algae Prevention System
Algae Prevention System circuit will have an ultrasonic sensor and LCD display interfaced with a PIC microcontroller. The ultrasonic sensor will be given pulse continuously so as to avoid the formation of algae in the surface of the water.

An algae is formed in a tank is transformation of ammonia to nitrate with an intermediate state of nitrite. For an example in an aquarium tank, it takes 4 days to 7 days for the complete formation of algae in the tank in presence of sunlight. The ultrasonic sensor is set on the inside wall of the tank.
Fig. 1: Block diagram of water distribution system

Fig. 2: Block Diagram of GSM Alert system
Figure 3 and Figure 4 show the entire prototype setup and its results obtained when the main tank is full and result obtained for sending alert SMS to streets respectively.

![Fig. 3: Result Obtained when Main Tank is Full](image)

The sensors role is to send vibrations in the form of waves inside the water, which breaks the molecules in the water and maintains it in its atom state. By alternate switching of the sensor the vibrations are produced in order to make the water free from algae. It reduces the chances of algae formation in the tank. Figure 5 shows the flowchart of algae prevention system.

![Fig. 5: Block diagram of Algae Prevention System](image)

This system is coded by assigning PORT D for LCD Display and RB0 for the trigger of ultrasonic sensor of PIC16F878A. Initially the RB0=0 and when the system is turned ON ,the RB0=1 (the ultrasonic waves are continuously passed inside the water and send the data to LCD stating "ULTRASONIC ON" . Figure 6 shows the implementation of proposed prototype model.

![Fig. 6: Result Obtained when Ultrasonic Sensor is ON](image)
4. Conclusion
The automatic timer based corporation water supply with GSM alert and algae prevention system has been designed to make people aware of the date and time of water supply to avoid missing the water supply. This is done by interfacing GSM module SIM900 with programmed PIC16F887A and monitoring the water level in main tank to supply to the streets with SMS alert before the supply of water to the particular street. Additional feature of ultrasonic algae prevention system is done by interfacing an ultrasonic sensor to PIC IC to avoid algae formation in tank. This proposed system will be a suitable solution for the water distribution system.

References