A Smart Water Management System Using GSM and RFID-A Review

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Abstract: This paper presents an automatic recording and Water consumption by a consumer and also detection of the leakages in the water distribution system. Water leakage is an important component of water losses. In addition to raising consumer awareness of their water use RFID is also an important way to identify water leakage and water consumption. Water sensors are used to determine the leakage from municipal corporation pipeline. The objective is to overcome the disadvantages of using current meter technology and make the billing and troubleshooting process faster along with reducing the wastage of water. RFID uses electromagnetic fields to transfer data over short distances. RFID is useful to identify people, to make transactions.

Keyword: **water level sensors, flow sensors, Motor, SMS, leakage detection, automatic meter reading, Arduino atmega328, LCD, water pump, water tank, RFID.**

1.INTRODUCTION

This project divided into two part; in first part leakage detection system is designed and in second part RFID system is implemented for user identification. Water is the basic necessity of economic development, but now days the water distribution and management are controversial issue and so nobody was to take this effort. An operator fills the tank automatically from water resources. The level sensors are placed inside the water tank placed near the source, depending on the level of the water in the tank the motor is made automatically ON or OFF. One of the most important advantages is that water sensors are placed in the pipe, it senses the flow rate and it gives value to GSM , it notifies the microcontroller which varies the rpm of the motor. These sensors give square wave output which is proportional to the quality of the water. These sensors output from GSM is gives message to the owner where leakage is identified. RFID is used for identification of user i.e.to measure amount of water used by consumer and according to uses billing can be done.

Water from the tank will be used when there is a problem with the direct water supply. It is so important where at some government buildings the water level in the tank is being inspected daily to ensure the water level is above the required threshold. However, this task consumes time and energy as the tank is located at the top of the building that cannot be easily accessible. Therefore, there is need to implement an automatic system that can monitor the level of the water in the tank. If the level is decreasing below the required threshold, the intended personnel will be informed immediately via a smartphone for example. The decrease could indicate a failure in the mechanical system to pump the water into the tank. Results from the experiments show that Radio Frequency Identification (RFID) technology has the potential to be used in monitoring the tank water level although there is drawback such implementation cost due to hardware requirements.

The current paper focuses on smart water management system to overcome above drawback. The RFID is used for user identification so, we can identify how many liters of water uses by consumer. The billing system is done on the basis of amount of water usage.

Paper focuses on an application of wireless sensor networks for leakage detection in underground water pipes to overcome the problem of water dispersion in water distribution networks. Leakage prevention and breaks identification in water distribution networks are fundamental for an adequate use of natural resources. To address this problem, and simplify the leakage identification process, the authors have designed a wireless network system making use of mobile wireless sensors able to detect breaks and save energy, time and cost with having Smart Water Leakage Detection (SWLD) in pipelines, measure water level in tank and control in pump to turn it on when water level is low. It focuses mainly on two parts: The first part is alarm based on Global System for Mobile technology (GSM) to send Short Message Service (SMS) to the owner.

2.Objective

Water, once an abundant natural resource, is becoming a more valuable commodity due to droughts and overuse. Hence, it is important to use a Tank water level monitoring system to avoid overflow by intimating the level of water in the tank. water controlling system implementation makes a potential significance in home applications. The existing automated method of level detection is described as something which can be used to turn the motor device on/off to start the feed pump at a low level and allow it to run until a higher water level is reached in the water tank. This helps enhance the water management system.

This project deals about ATMEGA 328 microcontroller. The technique /ideas suggested in this projects are universally applicable, globally, novel, cost, effective ecofriendly and can be applied leakage detection anywhere to save water.

The objectives of the project are:

- Power conservation.
- Automatic on/off switching operation.
- Wireless Communication.
- Can be implementing on any water source.
- Accuracy.
- Mobile Access.
- Automatic billing system.
- User identintification.
- Leakage detection.
- Water level monitoring
- Automatic recording of distribution of water

3.LITERATURE SURVEY

The main objective of this investigation is to build up a framework to monitor a water level3 of a water source from an inaccessible area. The IoT based system given during this study is going to be useful to attain such task. The prototype system experiment of this study allows keeping track of a water supply from remote area continuously. The real usage of the system would require changes in detector and few alternative technologies and source code in spite of the fact that the system and working rule continue as before. This IoT based proposed system is used to acquire water level and its evaporation details of a water source in real time from any location, any device connected to Internet. This water evaporation data can be used for various purposes for better management of water source. Monitoring water evaporation from remote location may be very useful when it is not possible to visit location physically every time. The system can be implemented for different sources of water by replacing sensor device suitable for the condition. Concluding the proposed IoT based water evaporation monitoring system will be helpful to collect, analyze and predict the water level detail, water usage and other information of particular water source at particular *location* in real-time remotely(S.Prem Kumar et.al).

The current paper focuses on implementing a smart water management system to assist users in obtaining real-time data for real-time analysis. The system provides the user with real-time data for water consumption since it monitors consumption as a whole. It also creates various visual graphs of the collected data and represents them in a readable manner to the customer. The scope of the paper does not allow for it to focus on the continuous development of analogue water meters for greater accuracy or to consider how the raw data can be linked to the billing utility system. A meter interface node was developed that makes use of open source tools. This enables the user to modify the source code to suit the own needs or those of the service provider. The developed system provides the user with a real-time monitoring system for water consumption, but it can also be used for other services such as leakage detection and localization. The system provides a short-range communication of 100m, though with more households using the same system, the coverage range will be increased since the system supports mesh network topology. Tools used for visualization are open-source, which makes them cheap to develop and integrate. A web-based interface is also developed that visualizes real-time and historical water consumption. Moreover, the monitoring system can serve to help users change their water usage and reduce water consumption, as well as to identify and fix abnormal water consumption
(Mduduzi John Mudumbe et.al).

This paper presents an IoT device which helps to manage/monitor and plan the usage of water by observing the level of water in the tank. By using The Internet of Things (IoT), we can regulate the usage of water in residential/offices. The device uses sensors to record the level of water in the tank at any instant and sends the data to the cloud using Wi-Fi. The information gathered can be read by

users on the integrated website using their smartphone/laptop device connected to the internet. The device also controls the automatic functioning of water motor by turning it on when the water level lies between the low level and the high level (the specified range) and by turning it off when the water level falls below the low level or rises above the high level. The IoT is an important technological advancement which takes the internet and networks to everyday life domains like controlling home appliances, management of water intake and keeping the overall energy intake under control. It encapsulates several technologies such as information technology, cognitive sciences, communication technology, and low-power electronics. IoT creates a newer information society and knowledge economy. The development of the IoT brought into light many new challenges including the lack of fundamental theory supporting, unclear architecture, and immature standards. This concept has helped improve the basic outline of water management techniques by keeping the user up to date by storing the information regularly, obtained using certain variables with the help of network sensors. The existing automated method of level detection is based on measure of minimum and maximum level of water in the tank which facilitates the automatic switching ON/OFF of the motor. If minimum input water level value is reached, the Motor is turned ON. It begins to fill water in the tank until maximum input water level value is reached in the water tank. Once the maximum water level value is reached, the motor is turned OFF. The user can keep track of the usage of water and plan accordingly the range of water level to be administered. Thus, this device helps achieve certain level of optimal usage of water which in turn makes water management more effective (Savita Lade et.al).

This paper presents the preliminary results of our experiments. The final objective is to make RFID as the viable solutions to this problem. Based on the number of tag readings, we can rely on RFID to monitor the application that involves people lives such mountain water stream monitoring that can suddenly produce the dangerous flash flood. In future works, we will use fixed RFID to increase water level in the water tank. The reading difference was so significant where the tag reading below the water surface lost about 70% of readings compared to the tag reading above the water surface. However, the implementation cost is still very high because of the use of the RFID reader. The RFID reader also needs to be connected to the Internet module to send the data. It may be viable to be used in an the read range and also to try other technology such as Bluetooth-based beacon to simplify the implementation (Hairulnizam Mahdin et.al).

This paper cover the automatic water management system. This system is completely operator free. All operation include the water management system is fully automatic. status updates on mobile through GSM. A tank is placed near the resource and level sensors are inserted in the tank. The whole system is controlled by the microcontroller. Depending on the level of the water in the tank the motor is automatically ON and OFF. The valve open or close message is send, the corresponding solenoid valve is opened or closed. Flow sensors are placed in the pipe, it sense the flow rate and it gives value to GSM and it notifies the microcontroller the it varies the rpm of the motor. This result efficient water distribution to different areas. The flow sensors are placed to sense the quality of water and generate square wave output proportional to the quality of water flow. Sensors output is given to GSM modem at the user end through microcontroller. GSM modem also transmits data regarding the quality of water in the form of SMS to office side. Modem at the office end receive these SMS and gives o the billing software for calculating bill. These calculated bill is send to the customer's side through SMS or Email. If any of the leaks occur in the pipes, flow sensor sense the quality of water, but there is a decrease in the quality of water. It results the square wave output proportional to the quality of water become distorted. This value is given to the microcontroller and it send error message. The operators check the corresponding pipeline according to the message. The advantage of this system is that water is distributed efficiently and effectively. This GSM based system provide accurate consumption of water to customers and also provide leak management system (Berlin S John).

In this paper, we proposed a fully automated system for supply-water management, distribution and billing. Water level sensors were used to determine the level of the water in the master tank. Based on the water level, the switching of the pump was controlled automatically using a PIC microcontroller based system. For distribution, a DTMF based gating system was used to control the supply

by mobile calls from remote location using a GSM module. All the updates were made available to the concerned operator by sms for remote monitoring. Flow meters were used to measure the total amount of water consumed per month. Using existing mobile network these data could be sent to the remote server for billing. The design of the overall system is described in a step by step manner. The system was implemented practically to a laboratory extent and also in computer simulations. The performance is evaluated and typical results are summarized which proves the efficiency and feasibility of the proposed system. In this paper we described a totally automated system for water supply, bill calculation and overall management of water for any region using GSM technology and microcontroller. This would overcome limitations of the existing systems and significantly reduce the manpower and associated cost. This system can be practically implemented in any region including cities or town. In addition, the water distribution, we proposed, can be combined with the irrigation system, and then the system would add an extra benefit because of mobile controlled water distribution. We can simply control water supply by using mobile to resident area and supply extra water for irrigation. It can also be important for fire control. If an area is affected by fire, then we can remotely stop water supply to other areas and can supply much water to that area to control fire. Furthermore, in future, this work can be extended to detect water leakage in different areas. Water supply can be controlled based on the consumer's demand and bill payment. The system can be interfaced with the internet for controlling and monitoring from any area **(**Janee Alam et.al).

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(Motaz Daadoo et.al).

The aim of this paper will be to help the water service providers to monitor the meter readings from the location. The customer can buy water by send SMS from his phone to control station through GSM and automatically receive the bill in his phone. Linked the server of Water Company with the server of telecommunications; to be the amount paid for the purchase of water is deducted from the existing balance in the customer's phone, If customer haven't phone; he will go directly to water company to buy water. At the control station, billing software calculates bill based on equation programmed. The control station issued order to valve to be open. The number of liters of water is determined, and then it transmitted to water meter consumed through exiting GSM network. Water day after day it becomes more scarce due to climate and rising temperature, and use it unwisely, billing system using Automatic water Meter reading help to preserved and rationalization consumption it. Automatic water Meter reading is one method reading and processing data automatically with computer and communication. (Mudathir A. O. Fagiri et.al)

Conclusion

Water is one of the most important basic need for all living beings. But, unfortunately a huge amount of water is being wasted by uncontrolled use and uncontrolled leakage. The main issue that is being addressed in this system is about using RFID and GSM based on water distribution system. Two different ways to monitor the water consumption are user identification and water leakage detection system. Finally, the two parts of project for phase one are completed by using RFID and GSM technology. The system mainly depends on technical method which deals with control, features and effective methods for monitoring the plumbing at homes. Based on microcontroller ATmega 328 and GSM technology the main general purpose of this system, which is water leakage detection and user identification by using RFID, is achieved. Use of GSM technology makes the work more efficient. Firstly, it

makes the home owner able to be notified when leakage occurs and also the solenoid valves will be closed directly. Secondly, using GSM which deals with mobile allows the home owner to close water tap, avoiding the water wastage.

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