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AUTOMATED WATER DISTRIBUTION AND PERFORMANCE MONITORING SYSTEM USING FPGA

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ABSTRACT

Enormous growth of residential areas has lead to over demand of water to fulfill daily activities. Without daily water nothing happens in any kind of environment. Importance of water is realized only when it is not available. People utilize water for different purposes and consume them by many ways. But there are lots of issues which arise when they consume in large amount. That is termed as water theft. It leads to scarcity of water in some areas. Among a particular water distribution unit problem arises between consuming units because of water theft. Also many problems occur when supplied water is in lack of quality because of leakage in pipelines or by contamination because of harmful organisms. To overcome those issues proposed system consists of flow monitoring system, quality assurance system and automated supply system. Such a combine system is capable of predicting flow of water, issuable of water with appreciable quality and automatic supply of water. It can be done by employing sensors such as flow sensors and pH sensors. Automatic supply acts as solution for the need of experienced operators and wastage of water during supply.

KEYWORDS: Flow measurement, over consumption effects, water quality assurance, automated supply, flow sensor, pH sensor.

INTRODUCTION

Water is said to be another basic need for all living beings. Water which is in need must be with appreciable quality and quantity. In residential areas water has to be supplied properly at appropriate time without wasting it and with quality. Entities which examine the efficiency of water supplying networks are Continuous supply, water, maintaining water quality, Controlling technological parameters, Availability and storage capacity of water tanks [1]. Here I have explored an idea as solution for the issues such as improper water supply, water quality and over consumption by people. Solution focuses with automated supply of water, over consumption alert and usage of various sensors to monitor water flow and to check water quality. The system comprises of water distribution unit which is an integrated component of main unit for distribution and home units for consuming. Automated water supply can be done by embedding the details into microcontroller such as time and place to which water have to be supplied. Sensors are used in this idea because they are capable of handling even small changes and act accordingly since they are task specific. Communication support for over consumption alert can be given by using zigbee. Network which consists of ZigBee has three main devices, co-coordinator, router and end-device [3]. Quality water can be assured by using pH sensor which consists of measuring electrode and reference electrode. Water is said to be with perfect quality if its pH value is 7. In the proposed idea, water supply is stopped if water is not with desired quality.

PROBLEM STATEMENT

As residential area grows, all the needs of people have to be satisfied for an issueless life especially in case of water. Networks of Water Distribution are said to be the most interesting domain for research activities. It focuses on distributing water to all channels (connections) in a particular area. Various actions performed with this activity are, checking whether all channels gets water supply, evaluating the amount of water flow in appropriate channels, intimation on over consumption by the users, ensuring that the supplied water is with good quality and flow [2]. Every area is provided with a centralized water distribution unit which distributes water to all home units in that

particular area. This unit contains overall amount of water needed to provide proper supply to all home units. To assure perfect supply, connections to all home units have to be made very clearly [3]. Automated supply ensures that supplied water is not wasted. The water supply systems are part of the urban infrastructure which must assure the continuity of the water distribution and the water quality control [4]. In earlier developed systems, urban water is supplied to the home with the help of some man power. Allocated $person will go to that distribution unit and will initiate the system to supply water to all home units [6]. This type of operation needs man power. Time consumption is very high in this method. Also if operator does not do the proposed task perfectly then the output of the task will not be good. Because of this supply people will use enormous water if it is supplied beyond time limit which leads to scarcity of water. Over consumption of water is known as water theft [2]. When water is supplied there will be huge usage and when there is no supply normal life will be spoiled due to absence of required water quantity. Water is the basic needs of the humans. It should be provided at correct time to fulfill the daily activities [5]. The theft can be avoided only when people are aware of water usage and when they make complaint about water theft. It will be completed only when water usage is reduced by the people so that there will be less demand for water.

INTENTION OF DEVELOPED IDEA
In this work the disadvantages of existing system are overcome by certain methods. To avoid wastage of water during supply to water distribution unit related areas, automated supply has been formulated. It has a process of supplying water to a particular area at particular time. Water supply will be stopped automatically after reaching fixed value limit. Over consumption can be intimated by measuring the flow of water to every connection in water supplying network. This measurement can be done by using flow sensor at every channel (connection)[7]. On the basis of this measured value, usage of water by every home unit is calculated. By comparing fixed value and measured value overconsumption can be easily formulated [8]. Automated supply also focuses proper supply of water to all connections. Water quality can be assured by employing pH sensor. If the supplied water is with desired quality then many issues will be avoided. Automated supply avoids the wastage of water and the quality of supplied water can be assured by utilizing pH sensor. Flow measurement on each channel enhances the method to intimate over consumption alert.

SYSTEM ARCHITECTURE
To perform all the decided tasks the following system design is formulated by utilizing components such as flow sensors, pH sensors, FPGA Kit and analog to digital converters. Water flow in each home unit is measured and intimated to the main distribution unit. On evaluating these measured values the home unit which over consumes water can be easily identified and alert is produced on over consumption. Also water supply to that particular home unit is stopped. Automated supply ensures that human operation is not compulsory.
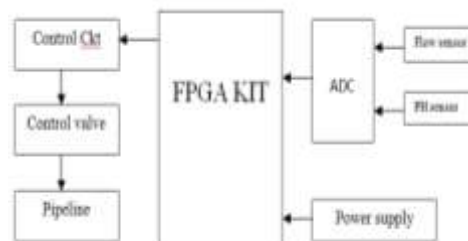

Fig 1.

System design for proposed idea But it is needed to switch on the water distribution unit. These tasks are meant to supply water to all areas properly. Also quality of supplied water is very much important so to ensure that, quality must be checked. In order to perform that pH sensors are also added to system to check the quality of supplied water.

IMPLEMENTATION
All the planned modules can be implemented by using VHDL. Automated supply can be well executed by embedding all the details such as time and quantity to the FPGA KIT. SPARTAN 3E FPGA Kit is used in the

proposed system. Flow measurement on each channel can be easily measured by using flow sensors. Voltage produces when water flow through the sensor and by modulating the calculated value, flow can be easily found. All home units will not be consuming water same. Some can consume water quantity beyond the required level which leads to scarcity among other home units. By measuring flow in all home units, the one with high water consumption can be easily found and over consumption alert is produced. The quality of water is check by pH sensors. It comprises of two electrodes such as measuring electrode and reference electrode. Hydrogen ions plays important role in checking quality. For each solutions reference value is known and for the used solution, hydrogen ion quantity can be found by using measuring electrode. Water is said to be with perfect quality if its pH value is 7. Finally the overall water distribution unit is built upon automated supply, proper flow measurement and over consumption alert along with assurance of quality .

CONCLUSION

Enormous growth of developing world has lead to huge need of water. Automated water distribution and performance monitoring system focuses on various entities such as proper supply, over consumption alert and water quality assurance. Those factors can be effectively monitored by using flow sensors and pH sensors. Future work deals with tasks such as water level detection and intimation of less volume of water in main tanks which are gathered from other tanks located in different places.

REFERENCES

[1] Mahima Agumbe Suresh, Radu Stoleru, Emily M.zechman, Basem Shihada: "On event detection and localization in acyclic flow networks", IEEE Transactions on systems, man and cybernetics, May 2013.
[2] Gouthaman, Bharathwajanprabhu, Srikanth: "Automated urban drinking water supply control and water theft identification system", IEEE student's technology symposium, January 2011.
[3] Panindra reddy, Eswaran: "Metro overhead tanks monitoring system using ZigBee based WSN", IEEE conference on Information and Communication Technologies, 2013.
[4] Prashant palkar, Shrinivas patil, Pooja Belagali, Ashish Chougule: "Automation in drinking water supply distributed
[5] V.Rajeswari, Padma suresh, Y.Rajeswari: "Water Storage and Distribution System for Pharmaceuticals using PLC and SCADA", International conference on Circuits, Power and Computing Technologies, 2013.
[6] Hiroshi Matsuki, Yasutaka Fujimoto: "Operational Knowledge Acquisition for Water Supply Support System using PLS Regression"
[7] Abirami, Karlmax: "A Novel Fault-Tolerant Control Scheme for Water Distribution Systems", IEEE Transactions, 2013.
[8] Shih chang hsia, Ming-hwa sheu, Yu jui chang: "Arrow pointer sensor design for low cost water meter", IEEE sensors journal, April, 2013.
[9] Andrea Cataldo, Giuseppe cannazza, Egidio de benedetto, Nicola giaguinto: "A new method for detecting leaks in underground water pipelines", IEEE sensors journal, June, 2012.