International Journal of Interdisciplinary Innovative Research &Development (IJIIRD)
ISSN: 2456-236X
Vol. 04 Issue 02 |2020

Efficient Water Distribution Network by Using Wireless Sensor Network

[1]Satish Reddy A
[1]Department of computer science, Jain university, Bangalore. India

ABSTRACT

Now a day's demand for water is continuously growing along with the population, it is necessary to distribute the sufficient and uniform quantity of water to the regional areas, industrial areas and emergency through the network of pipes. The main aim is to distribute the water uniformly to all geographical regions in particular time based on the requirements in order to improve the quality of services and to reduce water waste. The design works in such a way that the quantity of water being supplied to a particular region will be monitored by the virtue of quantity and time it is being supplied for. The system collects the data like quantity and the time about water supply. The water supply can be monitored based upon the available water level.

1. INTRODUCTION

In daily life water plays crucial role to survive all human, animal and plant life in planet. Not only have we needed water to grow our food, generate power and to run industries, but also for basic needs. Now a day's scarcity of the water takes place because of improper distribution. Increasing of population in many regions becomes big challenge and most important to distribute water to each and every individual. as we develop efficient distribution system man power is included to control the outflow of water from reservoir IOT are used to manage and monitor[1].To overcome, man power must have needed to control the distribution of the water from one region to another region. This work suggests that uniform distribution of water by using pH sensor to manage the water flow through the network of pipes and based on the previous data log charging discharging of water storage.[1] [2]

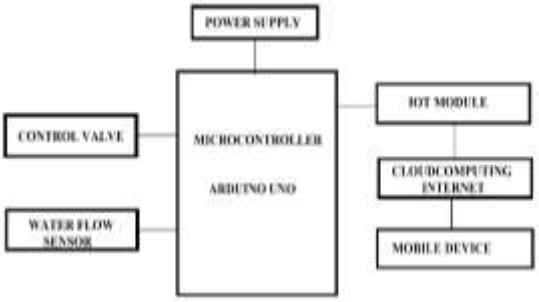

Fig.1 Network by using wireless sensor network.

2. MOTIVATION

The main motivation of this work is to prevent the uneven distribution of water to the specified regions. Efficient water distribution network using wireless sensor network reduces the man power in water distribution department, man creates the problems to the specific regions by supplying less amount of water and also provides the best way to serve water, prevent the overflow of water. It provides remote monitoring and controlling of water distribution and makes easy to work from the office in efficient way.

3. LITERATURE REVIEW

Several models proposed that water distribution to several regions in different types i their own way. APWRD (Andhra Pradesh water resource department) previously developed the water distribution network to serve equal quantity of water to each and every region for uniform distribution of water APWRD used the previous data logs of water resources which was present and distributed before .the data should be collected through the satellite by monitoring the available water in the reservoir. Based on the collected data water should be supplied and monitor the level of water in reservoir. Distribution can be done according to outflow-in flow storage [3-25].it failed to update the data in frequent use of water and previous data should be stored unstructured manner. Mainly it fails to distribute the water in efficient way to each and every region and supplies more water to the industrial regions, man power which used to monitor and distribute water violates the rules while distribution of water here to overcome from the defects in this paper we presents that best of serving

water to each and every region in efficient manner .many IOT are used are control valve , microcontroller , monitor and control , cloud storage .Based on the data that quantity of water present in there savoir, uniformly distributes water to the many regions according to the usage and the quantity of water required to the specified region[25-45].

4. PROPOSED MODEL

In these components and the working of the efficient water distribution network using wireless sensor network should be presented.

4.1 Solenoid valve:

Here it should be controlled by using the microcontroller by sending the signals by relay contact .it works based on the signals generate from the microcontroller ,if the input is digital signal 1 than the valve in on ,if input is digital 0 than the valve is off the process of ON and OFF is processed by energizing the coil .when solenoid valve is on than the water flows through network of pipes from the reservoir . when it is OFF it stopes the water outflow through network of pipes [45-50].

4.2 Arduino microcontroller:

Arduino is used to make the electronic projects; it consists of the things which are used to make electronic projects. if provides efficient way of platform to embed the code to control the IOT. here embedded code is interface with the other IOT things by using USB and other ports and pins to control the flow of water in pipes from the reservoir.

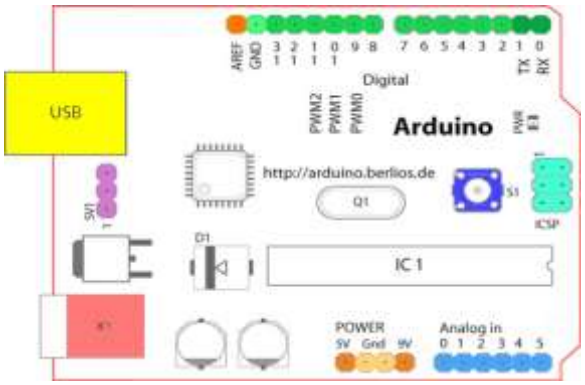

Fig.2 Blue-print

4.3 Water flow sensor:

It should be used to sense the water flow in network of pipes from the reservoir. when the water solenoid valve is on water flows through the pipe, water flow sensor monitors and controls the flow of water through the pipe .it triggers the pulse or generates the pulls to the microcontroller based on the flow rate . Flow of water should be recorded and maintained proper logs of discharging of water from the reservoir.

4.4 Monitor and control:

Monitor and control should be done and to maintain the proper data log of charging and discharging of water from the reservoir. over the water flow sensor leakage of water is detected if the leakages value is 0 than no water leakage in the pipes, input signals to solenoid valve and Arduino microcontroller are monitored and makes to distribute the water is efficient way to several regions. Cloud storage is used to store the data .it become easier to distribute the water by accessing the water data from anywhere and anytime.

4.5 Architecture overview:

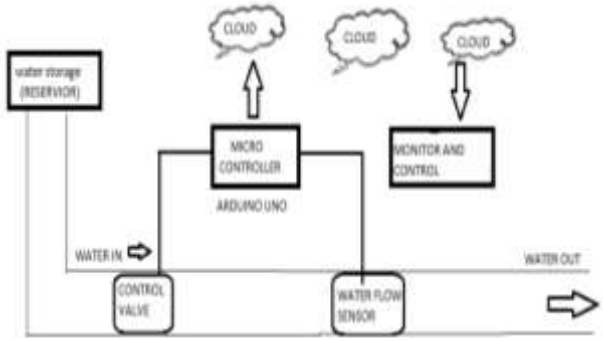

Fig.3 Architecture

Here the working of the architecture is explained, above figure shows control valve, water flow sensor microcontroller with embedded Arduino, cloud storage, monitor and control the Arduino is embedded with the code controls and delivers the water time to time and also particularly mentioned time to the particular regions. Microcontroller is used to maintain the flow and solenoid sensors; it is specially programmed to turn ON a d OFF the water through the network of pipes and stores the date in cloud

5. MONITORING RESULT

Here water is distributed in efficient way by using the previous data of the water consumption over the different regions and the data is stored in the cloud. Control valve and solenoid valve are mainly used to control and efficient distribution by coded embedded microcontroller. Data should be stored in cloud makes to access the water resource data from anywhere and anytime.

6. CONCLUSION

Proper distribution of the water to different regions is done in this paper. Water Sensors will be controlled and monitored by the distribution team from the remote office and controls the overall network setup using the IoT. Water is saved for future usage of water to different regions. Distributes specified quantity of water using efficient water distribution network using wireless sensor network and avoids insufficient water distribution.

7. REFFERENCES

[1] L. Xia, "State Estimation of Municipal Water Supply Network Based on BP Neural Network and Genetic Algorithm," School of Environmental Science and Safety Engineering Tianjin University of Technology School of Environmental Science and Technology Tianjin University Tianjin, China E-mail: LihuiCHENTT@tom.com .
[2] Y. Zhou, "Flexible Design of Delivery Capacity in Urban Water Distribution System".
[3] Z. M. L. H. Dong Chao, "Research on the Optimization and Distribution Technology of Industrial Water," Tianjin Key Laboratory of Control Theory & Application in Complicated System Tianjin University of Technology, Tianjin 300384, China E-mail: dongpengjin@163.com .
[4] D. S. A. P. Mr. Santosh Gautam Kashid, "A Survey of Water Distribution System and New Approach to Intelligent Water Distribution System".
[5] B. Jiang, "Based on the Metering Zone Water Distribution Network Node Flow Research".
[6] Z. D. L. S. Z. M. Y. Y. G. J. Shu Shihu, "Decision support system of water distribution network expansion A case study in a City".
[7] L. K. a. Z. Zhang, "“Water Environment Monitoring System Based On ZigBee Wireless Sensor Network”," 978-1-4673-5000-6/13/$31.00 ©2013 IEEE.
[8] M. Srihari, "Intelligent Water Distribution and Management," Conference on Inventive Research in Computing Applications (ICIRCA 2018), 2018.
[9] M. BM and H. Mohapatra, "Human centric software engineering," International Journal of Innovations & Advancement in Computer Science (IJIACS), vol. 4, no. 7, pp. 86-95, 2015.
[10] H. Mohapatra, C Programming: Practice, Vols. ISBN: 1726820874, 9781726820875, Kindle, 2018.
[11] H. Mohapatra and A. Rath, Advancing generation Z employability through new forms of learning: quality assurance and recognition of alternative credentials, ResearchGate, 2020.
[12] H. Mohapatra and A. Rath, Fundamentals of software engineering: Designed to provide an insight into the software engineering concepts, BPB, 2020.
[13] V. Ande and H. Mohapatra, "SSO mechanism in distributed environment," International Journal of Innovations & Advancement in Computer Science, vol. 4, no. 6, pp. 133-136, 2015.
[14] H. Mohapatra, "Ground level survey on sambalpur in the perspective of smart water," EasyChair, vol. 1918, p. 6, 2019.
[15] H. Mohapatra, S. Panda, A. Rath, S. Edalatpanah and R. Kumar, "A tutorial on powershell pipeline and its loopholes," International Journal of Emerging Trends in Engineering Research, vol. 8, no. 4, 2020.
[16] H. Mohapatra and A. Rath, "Fault tolerance in WSN through PE-LEACH protocol," IET Wireless Sensor Systems, vol. 9, no. 6, pp. 358-365, 2019.
[17] H. Mohapatra, S. Debnath and A. Rath, "Energy management in wireless sensor network through EB-LEACH," International Journal of Research and Analytical Reviews (IJRAR), pp. 56-61, 2019.
[18] H. Mohapatra and A. Rath, "Fault-tolerant mechanism for wireless sensor network," IET Wireless Sensor Systems, vol. 10, no. 1, pp. 23-30, 2020.
[19] H. Mohapatra and A. Rath, "Detection and avoidance of water loss through municipality taps in india by using smart tap and ict," IET Wireless Sensor Systems, vol. 9, no. 6, pp. 447-457, 2019.

[20] M. Panda, P. Pradhan, H. Mohapatra and N. Barpanda, "Fault tolerant routing in heterogeneous environment," International Journal of Scientific & Technology Research, vol. 8, pp. 1009-1013, 2019.
[21] D. Swain, G. Ramkrishna, H. Mahapatra, P. Patra and P. Dhandrao, "A novel sorting technique to sort elements in ascending order," International Journal of Engineering and Advanced Technology, vol. 3, pp. 212-126, 2013.
[22] H. Mohapatra, "HCR using neural network," 2009.
[23] V. Nirgude, H. Mahapatra and S. Shivarkar, "Face recognition system using principal component analysis & linear discriminant analysis method simultaneously with 3d morphable model and neural network BPNN method," Global Journal of Advanced Engineering Technologies and Sciences, vol. 4, p. 1, 2017.
[24] R. Kumar, S. Edalatpanah, S. Jha, S. Gayen and R. Singh, "Shortest path problems using fuzzy weighted arc length," International Journal of Innovative Technology and Exploring Engineering, vol. 8, pp. 724-731, 2019.
[25] R. Kumar, S. Jha and R. Singh, "A different approach for solving the shortest path problem under mixed fuzzy environment," International Journal of fuzzy system Applications, vol. 9, no. 2, pp. 132-161, 2020.
[26] R. Kumar, S. Jha and R. Singh, "Shortest path problem in network with type-2 triangular fuzzy arc length," Journal of Applied Research on Industrial Engineering, vol. 4, pp. 1-7, 2017.
[27] S. Broumi, A. Dey, M. Talea, A. Bakali, F. Smarandache, D. Nagarajan, M. Lathamaheswari and R. Kumar, "Shortest path problem using Bellman algorithm under neutrosophic environment," Complex & Intelligent Systems, vol. 5, pp. 409--416, 2019.
[28] R. Kumar, S. Edalatpanah, S. Jha, S. Broumi, R. Singh and A. Dey, "A multi objective programming approach to solve integer valued neutrosophic shortest path problems," Neutrosophic Sets and Systems, vol. 24, pp. 134-149, 2019.
[29] R. Kumar, A. Dey, F. Smarandache and S. Broumi, "A study of neutrosophic shortest path problem," in Neutrosophic Graph Theory and Algorithms, F. Smarandache and S. Broumi, Eds., IGI-Global, 2019, pp. 144-175.
[30] R. Kumar, S. Edalatpanah, S. Jha and R. Singh, "A novel approach to solve gaussian valued neutrosophic shortest path problems," International Journal of Engineering and Advanced Technology, vol. 8, pp. 347-353, 2019.
[31] R. Kumar, S. Edaltpanah, S. Jha, S. Broumi and A. Dey, "Neutrosophic shortest path problem," Neutrosophic Sets and Systems, vol. 23, pp. 5-15, 2018.
[32] R. Kumar, S. Edalatpanah, S. Jha and R. Singh, "A Pythagorean fuzzy approach to the transportation problem," Complex and Intelligent System, vol. 5, pp. 255-263, 2019.
[33] J. Pratihar, R. Kumar, A. Dey and S. Broumi, "Transportation problem in neutrosophic environment," in Neutrosophic Graph Theory and Algorithms, F. Smarandache and S. Broumi, Eds., IGI-Global, 2019, pp. 176-208.
[34] J. Pratihar, S. E. R. Kumar and A. Dey, "Modified Vogel's Approximation Method algorithm for transportation problem under uncertain environment," Complex & Intelligent Systems (Communicated).
[35] J. Sakhnini, H. Karimipour, A. Dehghantanha, R. Parizi and G. Srivastava, "Security aspects of Internet of Things aided smart grids: A bibliometric survey," Internet of Things, pp. 100-111, 2019.
[36] S. Gayen, F. Smarandache, S. Jha and R. Kumar, "Interval-valued neutrosophic subgroup based on interval-valued triple t-norm," in Neutrosophic Sets in Decision Analysis and Operations Research, M. Abdel-Basset and F. Smarandache, Eds., IGI-Global, 2019, p. 300.
[37] S. Gayen, F. Smarandache, S. Jha, M. Singh, S. Broumi and R. Kumar, "Introduction to plithogenic subgroup," in Neutrosophic Graph Theory and Algoritm, F. Smarandache and S. Broumi, Eds., IGI-Global, 2020, pp. 209-233.
[38] S. Gayen, S. Jha, M. Singh and R. Kumar, "On a generalized notion of anti-fuzzy subgroup and some characterizations," International Journal of Engineering and Advanced Technology, vol. 8, pp. 385-390, 2019.
[39] S. Gayen, F. Smarandache, S. Jha, M. K. Singh, S. Broumi and R. Kumar, "Introduction to plithogenic hypersoft subgroup," Neutrosophic Sets and Systems, vol. 33, p. Accepted, 2020.
[40] S. Gayen, S. Jha and M. Singh, "On direct product of a fuzzy subgroup with an anti-fuzzy subgroup," International Journal of Recent Technology and Engineering, vol. 8, pp. 1105-1111, 2019.
[41] Behura and H. Mohapatra, "IoT Based Smart City with Vehicular Safety Monitoring," EasyChair, vol. 1535, 2019.
[42] H. Panda, H. Mohapatra and A. Rath, "WSN-Based Water Channelization: An Approach of Smart Water," Smart Cities—Opportunities and Challenges. Lecture Notes in Civil Engineering, vol. 58, pp. 157-166.
[43] Xia, LI, "State Estimation of Municipal Water Supply Network Based on BP Neural Network and Genetic Algorithm," School of Environmental Science and Safety Engineering Tianjin University of Technology School of Environmental Science and Technology Tianjin University Tianjin, China.