ISSN 2395-1621

Smart Water Management

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ABSTRACT

This system represents the initial steps in the development of a water distribution and quality monitoring system. This system is based on a wireless sensors network to detect and locate in real time any change in water quality, quantify its importance, evaluate its consequences and determine the most appropriate actions to be taken to limit its effects. First, we start with determining of the quality control points of the water. Then, we move on to the development of a water level for future prediction in the water distribution system. Finally, taking into account the environmental parameters of our system, we propose a water distribution system based on the IOT concept we use different sensors to manage the water.

Keywords: Water management, Flow sensor, Ultrasonic Sensor, Wifi-Module, Notification.

ARTICLE INFO

Article History

Received: 6th May 2019

Received in revised form :

6th May 2019

Accepted: 9th May 2019

Published online :

10th May 2019

I. INTRODUCTION

The current scenario is, the employee will go to that place and open the valve for a particular duration, then again the employee will go to the similar place and close the valve, and it is time consuming.

This system is fully automated. Here human work and time are saved. This system will implement the design of IOT based water monitoring system that monitors the flow-rate and level of water in real time.
This system consist of some sensors which measures the all this water parameters and the primary concept of real- time IOT based water resources information system is to provide comprehensive and accurate information.

In some water-related field such as pre-flood warning system, irrigation system, electricity powerhouse, and research, water level information is a very important issue. Usually, water level measurement was done manually , however this can be not effective due to some difficulties like problem to reach the measurement site, human errors, etc . Some automatic water level measurement system have been made using mechanical sensors such as resistive sensors, capacitive sensors or magnetic sensors . but this sensors have to do direct contact with water that makes their life span shorter because of corrosion –on the other had ,this system uses ultrasonic sensor that can measure the water level without direct contact with water, which makes life span longer.

Now a day's different types of smart sensors are developing for the safety and security in emergency management strategy. Smart water management is only possible with help of IOT which includes the applications in monitoring the flow of water, Management of valves, fault detection within valves, Data analysis through Observations from different meters etc. in conventional method for each and every individual processes we require the human power and observation skills. To overcome these IOT plays the major role.

Water is an important resources all livings on the earth in that , some people are not getting sufficient amount of water because of unequal distribution. This system is used to avoid the wastage of water during the distribution period. The current scenario is very hectic and time consuming. System will be design by us is fully automated. Here human work and time are saved. To ensure the save supply of water the quality should be monitor in real time for that purpose , new approach IoT based water management and monitoring has been proposed .

II. LITERATURE SURVEY

[1] Monitoring system as a tool for risk evslution in water distribution system Alicja Balut, Andrzej Urbaniak 2018 In this paper, we monitor the quality of water and get the result on IOT. And we distribute the water by connecting the flow sensor.

[2] Real-time clustering for priority evaluation in a water distribution system Alexandru Predescu, C˘at˘alin Negru, Mariana Mocanu, Ciprian Lupu 2018, Nowadays with the development of smart infrastructure for water resource management, there is an increased need for efficient operation and management of water distribution infrastructures. In this paper, we propose a system for real-time clustering system priority evaluation in a water distribution system.

[3] Optimal Demand Response Scheduling for Water Distribution Systems Konstantinos Oikonomou, Roohallah Khatami 2018, As energy intensive infrastructures, water distribution systems (WDSs) are promising candidates for providing demand response (DR) and frequency regulation services in power systems operation. However, models that tap the full flexibility of WDSs to provide the services while respecting the operational constraints of water networks are remained scarce.

[4] Smart Water Distribution Management System Architecture Based on Internet of Things and Cloud Computing Sawsan Alshattnawi, Irbid Jordan2017, The fast population growth needs to provide clean and affordable water that meet the human requirements. The water faces a problem in the future because of global climate change. An efficient water management and treatment is necessary to keep water quality and availability.

[5] A Novel Smart Water-Meter based on IoT and Smartphone App for City Distribution Management M Suresh, U. Muthukumar, Jacob Chandapillai 2017, A novel approach to performing automated water-meter reading for update of consumption information from field to the Utilityoffice is described in this paper. The smart metering approach proposed differs from existing commercial methodologies by making use of low cost IoT hardware and smartphone app.

[6] Feasibility Study on Wireless Passive SAW Sensor in IoT enabled Water Distribution System Zhaozhao Tang, Wenyan Wu, Jinliang Gao, Po Yang 2017, Internet of Things (IoT) technology has recently been widely utilized into a variety of industrial applications. Wireless Passive Surface Acoustic Wave (SAW) sensors have attracted great attention in numerous IoT enabled applications. The sensor nodes are not directly supplied by the power supply as it absorbs the energy from the interrogating Radio Frequency (RF) pulses to excite the SAW.

[7] Research on placement of water quality in water sensor in water distribution systems Chengyu Hu 2017, In this paper, we use turbity sensor, ultrasonic sensor, Ph sensor and flow sensor for monitor and distribution of water.

[8] Design and realization of water quality information management system Dongling Ma, Jian Cuil 2017, In this paper, we make the water quality monitoring system and distribution. We distribute the water by using flow sensor. And check by using turbity sensor and ph sensor.

[9] Temperature dynamics and water quality in distribution systems B. J. Eck, Saito S. A. McKenna 2016, Quality assurance strategies for water distribution systems often include the application of chemical disinfectants to limit the growth and transmission of pathogens. Characteristics of water quality in individual systems, and the type of disinfectant employed, create significant complexity in understanding and quantifying the impact of disinfectants in different networks. An additional challenge is that disinfection by products (DBPs),created through the breakdown of disinfectants, can bedetrimental to human health.

III. BLOCK DIGRAM

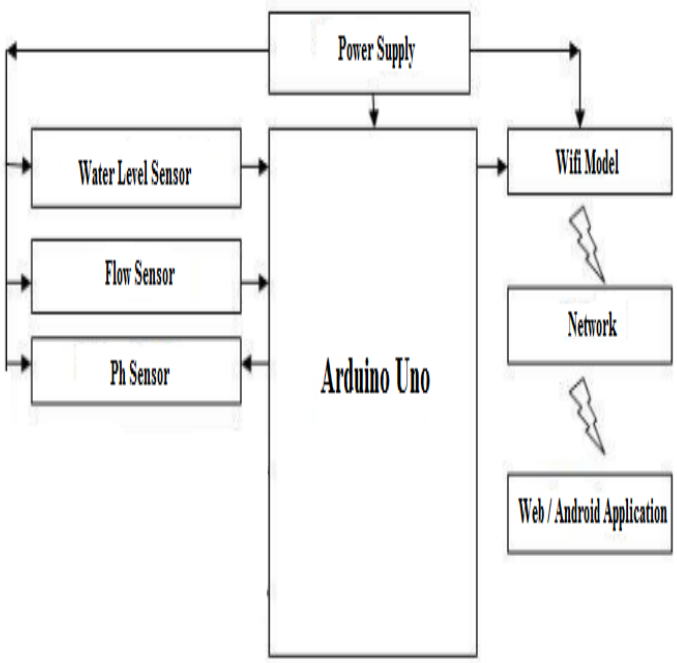

Fig 1. System block diagram

In the proposed smart android framework, a reconfigurable shrewd sensor interface gadget that coordinates information gathering, information preparing, and remote transmission is outlined. The equipment of remote water quality checking framework contains the accompanying parts:

- Ultrasonic Sensor
- pH Sensor
- Controller (ESP)
- Flow sensor
- Water pump

IV. HARDWARE DESCRIPTION

INTERNET OF THINGS:-

The internet of thing is the network of physical device, vehicles and other items embedded with electronics, software, sensors, actuators, and network connectivity which enable this objects to collect an exchange data.

The IoT allows object to be sensed or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, an resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention.

IoT is expected to offer advance connectivity of devices, system and services that goes beyond machine –to- machine communication and covers a verity of protocols, domains and application.

LEVEL SENSOR:-

Level sensors are specially- designed sensors which can establish the level of water present in a tank/ reservoir. This established water level can then be communicated to the central severs which are deployed for the purpose of effective water conservation as well as management.

This information is passed on to the central servers on a regular basis and also indicates the level of water is present in the reservoirs and tank.

Ultrasonic ranging module HC-SR04 provides 2cm-400cm non-contact measurement function, the ranging accuracy can reach to 3mm.If the level sensor are 4 pins echo, trigger, ground, Vin. The sensor can measure the level of water.

FLOW SENSOR:-

Effective water management involves supplying water according to real requirement and thus measuring water is vary essential step in water management system.

Flow sensor typically output a series of pulses proportional to the instantaneous flow rate which means that to interrupt them it necessary to implement a simple frequency component. Since this project use a water flow sensor containing hall –effect sensor that outputs a pulse rate proportional to flow rate. In this project used to the flow sensor to measure flow of water.

WI-FI MODULE:-

The ESP8266 Wi-Fi module is a self SOC with integrated TCP/IP protocols that can give any microcontroller access to your Wi-Fi network.

The ESP8266 is capable of hosting an application or offloading all Wi-Fi networking function from another application processor. Each ESP8266 module come-programmed with an AT command set Firmware. The ESP8266 module is an extremely cost effective.

There is almost limitless fountain of information available for the ESP8266, all of which has been provided by amazing community support.

WATER PUMP:-

Micro DC 3-6V Micro Submersible Pump Mini water pump For Fountain Garden Mini water circulation System DIY project. This is a low cost, small size Submersible Pump Motor which can be operated from a 3 ~ 6V power supply. It can take up to 120 liters per hour with very low current consumption of 220mA. Just connect tube pipe to the motor outlet, submerge it in water and power it. Make sure that the water level is always higher than the motor. Dry run may damage the motor due to heating and it will also produce noise.

V. MATHEMATICAL MODEL

Mathematical Model:

U= {I, O, f, S, F, D, NDD}

Where,

I= {I1, I2,I3}

I1= {l1,l2….. ln} where n size of tank and n>0

I2= f1 i.e. pulse counted using flow sensor

I3=pn i.e. size of pipe

O= {O1,O2,O3}

O1=level of water present in tank

O2=water consumed by user

O3 = bill generated

f= {f1,f2,f3,f4}

f1=QUANTITY (n, I1)

f2 =FLOW_RATE (I2,I3, O2)

f3 =CONNECT ()

f4 =REP_GEN (f1, f2)

S: Success:

- Data send successfully
- Report generated or not

F: Failure:

- Sensors not working properly
- Connection failure

D: Deterministic value, n

NDD: Non Deterministic Data value:

- Levels detected are randomly generated

VI. ALGORITHM STEPS

Algorithm: A pseudo code for controller is given below.

1. While (True):
2. Read control valve value
3. Is Control Valve Open = true
4. Read level sensor value, water flow value, bill generate amount.
5. Water quality value != Okay
6. Turn off control valve
7. Generate warming message
8. Calculate pressure from water flow
9. Upload sensor value, water flow value, bill generate amount value to hosted database or local cloud.

VII. RESULT

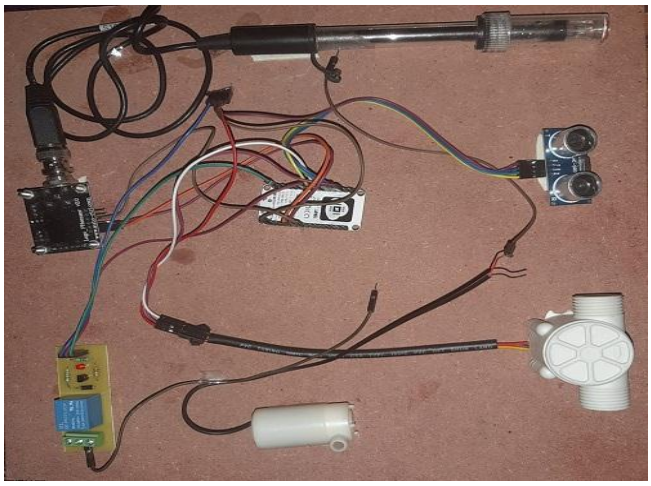

Fig 2. Full hardware setup

Fig 3. Login page

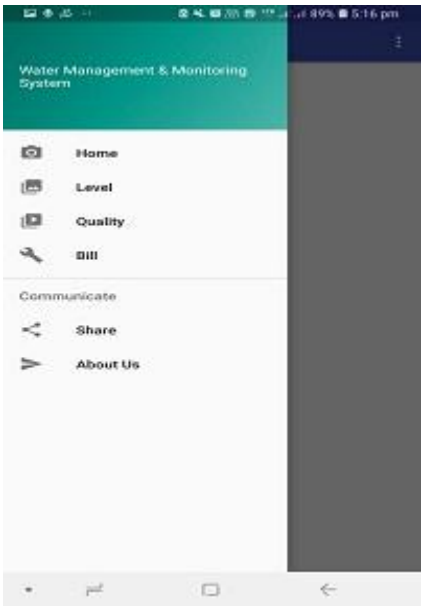

Fig 4. Admin home page

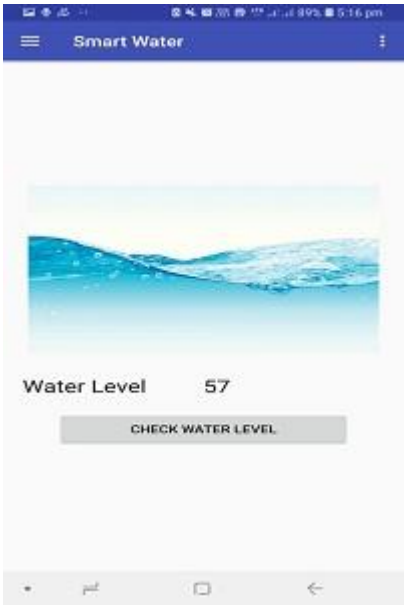

Fig 5. Water level indicate

VIII. CONCLUSION

Our intention of this research work was to establish a flexible, economical, easily configurable and most importantly, a portable system which can solve our water wastage problem. It is a robust system and small in size. Our proposed system for water level monitoring comes under the field of Internet of Things (IoT). Our main objective was to design a smart system for approximating the water level in the tank and prevent overflow or analyse the water usage. This analysing feature can also help us in finding whether there is any leakage in the tank or not. Nowadays liquid level monitoring is vital in many industries too like oil, automotive etc. Using our smart system we can analyse the usage and also detect the leakage in the tanks of these industries.

IX. ACKNOWLEDGEMENT

I wish to express my profound thanks to all who helped us directly or indirectly in making this paper. Finally I wish to thank to all our friends and well-wishers who supported us in completing this paper successfully I am especially grateful to our guide Prof. R.S Parte for him time to time, very much needed, valuable guidance. Without the full support and cheerful encouragement of my guide, the paper would not have been completed on time.

REFERENCES

[1] Kumar R, Singh R D and Sharma K D, 2005.Water resources of India; Curr. Sci. 89 794–811.

[2] Jain SK, Agarwal PK and Singh VP 2007. Hydrology and water resources of India (Dordrecht, Netherlands: Springer), 1258p.

[3] Postel SL, Daily GC and Ehrlich PR. 1996. Human appropriation of renewable freshwater. Science, 271: 785-788.

[4] Gosain AK, Rao S and Basuroy D. 2006. Climate change Impact assessment on hydrology of Indian River basin.Curr. Sci.,.90(3).,346-353.

[5] Lal M. 2001. Climate change-Implications for Indias water resources. J.India Water Res. Soc.,21, 101-119.

[6] Kumar R, Singh RD and Sharma KD.2005. Water resources of India.,Curr .Sci .89(5).,794-811. International Journal of Scientific and Research Publications, Volume 5, Issue 12, December 2015 356 ISSN 2250-3153 www.ijsrp.org

[7] Sharma, R. Climate and water resources of India,Curr.Sci..,2005,89,818- 824.

[8] National Water Policy.Ministry of Water Resources,New Delhi,2002.

[9] Central Water Commission, 1988. Water Resources of India, Publication No.30/38. New Delhi.

[10] Peder Hjorth and Nguyen Thi Dan, 1994, Water management options for urban areas in Asia. Cities 11(2): 125-130.

