Water Level Monitoring and Distribution Management System Using Raspberry PI

Dr.B. Sivasankari, P. Sowmiya, R. Vaikavi Janani, K. Vidhya, P. Deepa

Abstract— **Water is the most essential commodity for all living beings. A lot of problems are faced by drinking water utilities in real-time operation. The reason for these rising issues are due to limited water resources, ageing infrastructure, growing population, etc therefore need arises to provide better technology to monitor the quality of water. This water quality needs to be monitored in real-time to ensure safe supply of drinking water. In this paper we intend to present the design and development of a low cost system for real monitoring of water quality in an IOT environment. The parameters such as Level, pH, and dissolved oxygen of the water can be measured and also to intimate the water delivery time and date through SMS alert.**

Index Terms—**Water, Water level, IOT, pH**

I. INTRODUCTION

Water quality is the thought measure of the water suitability to be used for a particular routine based onselected physical, chemical, and other characteristic. The quality of water is determined by measuring and analyzing the characteristics of the water such as temperature, dissolved mineral content, number of bacteria, and so on. To decide if this water is suitable for use these characteristics are then compared to numeric standards and guideline. This is used to ensure that public water supplies are safe as possible for drinking and other purposes.The following parameters are measure by the Smart Water Quality Monitoring System for analysis: Potential Hydrogen (pH),Oxidation and Reduction Potential(ORP),Conductivity and Temperature using a RS technology. A stable set of results are to be perceived while monitoring these parameters. Therefore a continuous series of anomalous measurements would indicate the potential introduction of a water pollutant and the user will be notified of this activity with the aid of IoT technology. False positives, such as anomalous reading over a short period of time will be recorded but not treated as an alert. Hence, with the successful implementation of this monitoring approach, a water pollution early warning system can be achieved with the fully realized system utilizing multiple monitoring stations.

Dr.B. Sivasankari, Professor, SNS College of Technology, Coimbatore, India

P. Sowmiya, R. Vaikavi Janani, K. Vidhya, P. Deepa, UG Student SNS College of Technology, Coimbatore, India

II. EXISTING SYSTEM

Some of the system that failed prior to this system are

A. WIRELESS SENSOR NETWORK

This work presents a water quality monitoring system using wireless sensor network(WSN) technology and powered by solar panel. To monitor water quality in different field site and in real time, novel system architecture constituted by distributed sensor nodes and a base station is suggested. The nodes and base station is connected using WSN technology. Designed and implemented a prototype system using one node powered by solar cell and WSN technology.Data collected by various sensors in the node side such as pH, turbidity and oxygen density is sent via WSN to the base station. This novel system has advantages such as low carbon emission, low power consumption, more flexible to deploy and so on.

B. SMART COAST

The implementation of the Water Framework Directive(WFD)across the(EU),and the growing international emphasis on the management of water quality is giving rise to the an expanding market for novel, miniaturized, intelligent monitoring systems for fresh water catchments, transitional and coastal waters. this paper describes the "Smart Coast" Muti Sensor System for water quality monitoring. this system is aimed at providing a platform capable of meeting the monitoring requirements of the Water Framework Directory. The key parameters under investigation like temperature, phosphate, dissolved oxygen, conductivity, pH, turbidity and water level.The "plug and play" capabilities enabled by the Wireless Sensor Network(WSN)platform developed at Tyndall allow for integration of Sensors as required are described, as well as the custom sensors under development within the project.

III. PROPOSED SYSTEM

Drinking water is a very precious commodity for allhuman beings as drinking water utilities face a lot of new challenges in real-time operation.These challenges originate because of limited water resources, growing population, ageing infrastructure etc.Therefore there is a need for better methodologies to monitor water quality.In order to ensure safe supply of drinking water the quality needs to be monitored in real-time. In this paper we intend to present the design and development of a low cost system for real monitoring of water quality in an IoT environment.The parameters such as Level, pH, and dissolved oxygen of the water can be measured and also to intimate the water delivery time and date through SMS alert.
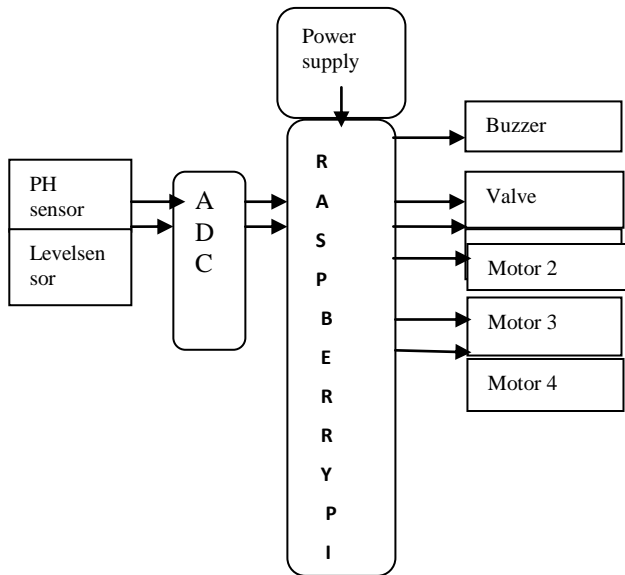
Water Level Monitoring and Distribution Management System Using Raspberry PI

Fig:1 Block diagram

IV. HARDWARE DESCRIPTION

The hardware tools used are

A. RASPBERRY PI

The Raspberry Pi is the super low cost computer with credit card size single board. The original Raspberry Pi and Raspberry Pi 2 are manufactured in several board configurations through licensed manufacturing agreements with network element 14(Premier Franell), RS Components and Egoman. The hardware is the same across all manufactures.
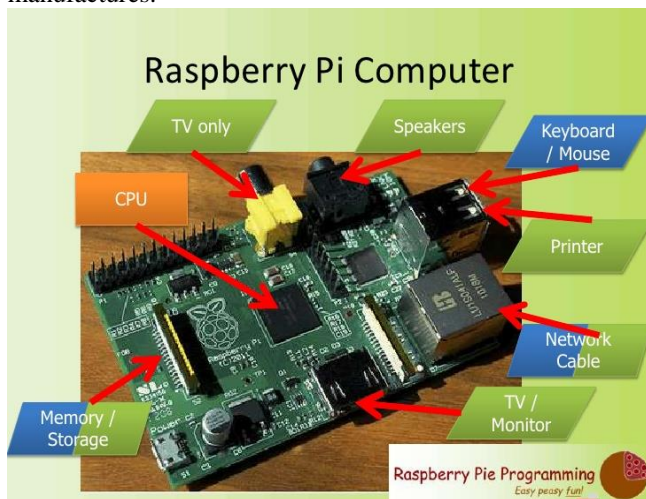

Fig:2 Raspberry pi

B. SENSORS

Sensors are used in everyday objects such as touch-sensitive elevator buttons and lamps which dim or Brighten by touching the base, beside innumerable applications.

LEVEL SENSOR

This is simple and small portable water level/ water droplet identification, detection sensor water that has high cost performance. It is a low power consumption and high sensitivity sensor with a detection range of 40mm x 60mm.Working temperature of this sensor varies from 10°Cto30°C.

Fig:3 Level Sensor

pH SENSOR

pH sensor is a scientific instrument that measureshydrogen-ion activity in water-based solutions, indicating it's acidity or alkalinity.
It is expressed in pH. pH meters measure the voltage between 2 electrodes and display the result converted into the corresponding pH value. They comprise a simple electronic amplifier and a pair of electrodes, or alternatively a combination electrode, and some form of display calibrated in pH units. It usually has a glass electrode and a reference electrode, or a combination electrode.The electrodes or probes are inserted into the solution to be tested.

C. BUZZER

A buzzer or beeper is an audio signaling device, which maybe mechanical, electromechanical or piezoelectric.Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or key stroke.

D. DC MOTOR

A DC motor is a class of rotary electrical machines that converts electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields.Nearly all types of Dc motors have some internal mechanism, either electromechanical or electronic,to periodically change the direction of current flow in the motor.

E. SOLENOID VALVE

A solenoid valve is an electromechanically operated valve. The valve is controlled by an electric current through a solenoid , in the case of a 2-port valve the flow is switched on or off; in the case if a 3-port valve the outflow is switched between the outlet ports. Multiple solenoid valves can be placed together on manifold.

V. WORKING DESCRIPTION

The level sensor is used to indicate the level of water in the main tank. At specified level, water is distributed to specified area.The quality of water is continuously monitored by the pH sensor and buzzer is turned ON if any changes in the water quality is sensed.Raspberry pi is a digital system. Where the output of level and pH sensor is analog output it is converted into digital output using ADC.Depending on the water level detected by the level sensor, water is given out by the automatic opening of the solenoid valve and distributed to the

indicated specified areas.Following this an SMS alert is sent to the consumers of the same indicated specified area.

When the water level goes below the minimum level, solenoid valve is closed and the main motor is turned ON to refill the tank.

OUTPUT

VI. CONCLUSION AND FUTURE WORKS

Water is an essential need for human survival and therefore must be some mechanisms put in place to vigorously test the quality of water that made is made available for drinking in town and city articulated supplies as well as the rivers, creeks and shoreline that surround our towns and cities. The availability of good quality water is paramount in preventing outbreaks of water-borne diseases as well as improving the quality of life. Manual water quality surveillance methods in India dramatically exacerbate water quality deterioration.

Considering monitoring essence, we need a continuous, real-time, in-situ monitoring system for water quality management. Wireless Sensor Network (WSN) fascinated us for pro-active water quality management due to their real-time continuous and dynamic nature to act as early warning system so that WSN can trigger appropriate alarm in hazardous situations. In this paper our aim is to monitor the quality as well as the level of drinking water in water tanks. In future this paper can be further enhanced by developing products and applications for individual household.

REFERENCES

[1] "International decade for action 'water for life' 2005-2015".
[2] http://www.un.org/waterforlifedecade/sanitation .shtml
[3] Sea Water Monitoring for Chemical Parameters,Retrieved from Gujarat State Project Management Unit
[4] http://www.geciczmp.com/Sea-water-monitoring-for-chemicalparam eters.aspx, Accessed on:November 4,2015.
[5] R.M.Bhardwaj,"Water Quality Monitoring in India – Achievement Constraints",Jun 2005;International Work Session on Water Statistics,Vienna
[6] F.Akyildiz,W.Su,Y.Sankarasubramaniam and E.Cayirci,"Wireless Sensor Networks:a survey",Computer Networks,Volume 38,Issue 4,pp393-422,2002
[7] "Guidelines for Water Quality Monitoring" http://www.cpcb.nic.in/upload/NewItems/NewItem_116_Guidelines of%20waterqualitymonitoring_31.07.08.pdf,July 2008.
[8] X.Yang,K.G.Ong,W.R.Dreschel,K.Zeng,C.S.Mungle,C.A.Grimes,"D esign of a wireless sensor network for longterm,in-situ monitoring of an aqueous environment",inSensors,vol 2,pp.455-472,2002.
[9] ZigBee Alliance,ZigBee Specification,2006 http://www.zigbee.org last accessed,10th-July-07
[10] Naveen Balaji, D. Rajesh "Smart Vehicle Number Plate Detection System for Different Countries Using an Improved Segmentation Method" Imperial Journal of Interdisciplinary Research (IJIR) Vol. 3, No. 6, 2017, pp. 263-268. ISSN: 2454-1362
[11] Naveen Balaji, N.V. Hari Suriya, S. AnandVikash, R.Arun, S. Arun Kumar "Analysis of Various Liquid Components under Different Temperature and Density Constraints Pertaining To Fractional Distillation" Imperial Journal of Interdisciplinary Research (IJIR) Vol. 3, No. 6, 2017, pp. 664-669. ISSN: 2454-1362
[12] Naveen Balaji, D. Rajesh "Python Based Reverse Timing Algorithm for Human Brain Activity Using Color Psychology" International Journal of Indian Psychology, Vol. 4, No. 3, DIP: 18.01.111/20170403, pp: 79-86, ISSN 2348-5396
[13] G. Naveen Balaji, S. Chenthur Pandian, D. Rajesh "High Performance Triplex Adder Using CNTFET" International Journal of Trend in Scientific Research and Development, Vol.1, No. 5, pp: 368-373, ISSN 2456 - 6470
[14] G. Naveen Balaji, S. Chenthur Pandian, S. Giridharan, S. Shobana, J. Gayathri "Dynamic and Non-Linear Charge Transfer Through Opto-Deportation by Photovoltaic Cell" International Journal of Trend in Scientific Research and Development, Vol. 1, No. 5, pp: 486-492, ISSN 2456 - 6470
[15] G. Naveen Balaji, S. Karthikeyan, M. Merlin Asha " 0.18μm CMOS Comparator for High-Speed Applications" International Journal of Trend in Scientific Research and Development, Vol. 1, No. 5, pp: 671-674, ISSN 2456 - 6470

[16] G. Naveen Balaji, K. Saravanan, R. Poorani, T. Vishnu Priya, R. Reka Raj "Advanced Security System using PIC through Bluetooth" International Journal of Trend in Scientific Research and Development, Vol. 1, No. 5, pp: 675-685, ISSN 2456 - 6470

[17] G. Naveen Balaji, N.V. Hari Suriya, S. Anand Vikash, S. Arun Kumar, R. Arun, "Gasoline Purity Meter Using Peripheral Interface Controller for Automobile Applications" International Journal of Engineering and Technical Research (IJETR), Vol. 7, No.10, pp:46-55, ISSN: 2321-0869

[18] G. Naveen Balaji, S.Chenthur Pandian, "Design for Testability of Kipbond Logic" "Perspectivas em Ciência da Informação" (Annexure - I), School of Information Science of the Federal University of Minas Gerais (UFMG), Vol. 22, No. SP.01, pp: 261-284, ISSN 1413-9936

[19] G. Naveen Balaji, V. Nandhini, S. Mithra, N. Priya , R. Naveena, "IOT Based Smart Crop Monitoring in Farm Land", Imperial Journal of Interdisciplinary Research (IJIR) Vol. 4, No. 1, pp: 88-92, ISSN: 2454-1362

[20] G. Naveen Balaji, N. V. Hari Suriya, "Effective Badminton Coaching Schema using PIC16F887 Microcontroller", International Journal of Trend in Scientific Research and Development, Vol. 2, No. 2, pp: 178 – 182, ISSN 2456 - 6470

[21] G. Naveen Balaji, S. Chenthur Pandian, "Power Analysis of a Transmission Gate based Scan Flip Flop", International Journal of Engineering Research in Electronics and Communication Engineering (IJERECE) Vol 4, Issue 11, November 2017, pp:48-53, ISSN: 2394-6849