Internet of Things (Iot) Enabled Water Monitoring System

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Abstract- ***Due to the present global environmental situation the water is getting polluted and is being wasted. So water management and conservation is vital for human survival. In the recent times, most of the consumer based humanitarian projects are being rapidly developed using Internet of Things (IoT). In this paper we proposed an IoT based water monitoring system that measures water level in real time. Our prototype is based on the idea that the level of water can be very important parameter. An ultrasonic sensor is used to measure the level of water in the tank and the level gets displayed on the cloud dashboard like thingspeak in real time. Our prototype helps the user to know the status of water in the tank irrespective of his current location.***

Key Words—Internet of Things (IoT), Thingspeak, Ultrasonic Sensor, Water level.

I. INTRODUCTION

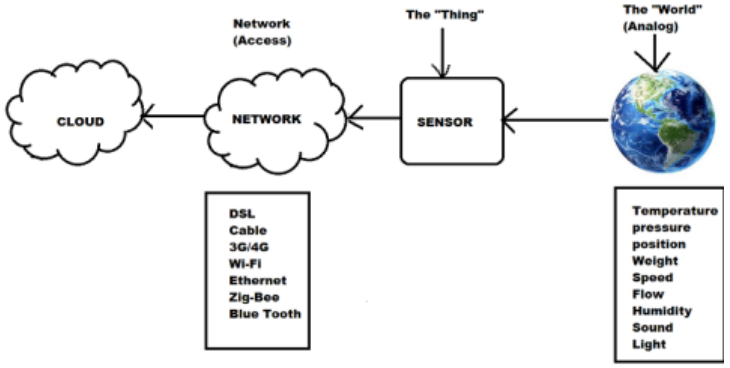
Water is a limited resource and is also essential for agriculture, industry and for creature survival on the earth including human beings. Now a days more water is being wasted in many uncontrolled ways. This leads to the extinction of water as it is limited resource. Therefore efficient use and water monitoring is essential.

With the help of water monitoring system, water wastage will be reduced, also the power consumption gets reduced. There by, we can preserve water for next generations. Through water level monitoring, we can avoid over flowing of water from the tank. Water level monitoring system application is more significant in home applications.

Internet of Things (IoT) is the network of physical devices, sensors, actuators and connectivity which enables these objects to connect and exchange data. "Things" in the IoT sense refers to various devices such as heart monitoring implants, biochip transponders, cameras, sensors, etc., These devices collect useful data with the help of various existing technologies and then autonomously flow the data between other devices. IoT allows objects to be sensed or controlled remotely across existing network. IoT creates more opportunities for more direct integration of physical world into computer based systems which improves efficiency and accuracy of the systems.

There are number of applications for internet connected devices. Multiple categorizations have been suggested, most of which agree on a separation between consumer, enterprise and infrastructure applications.

The ability to network embedded devices with limited CPU, memory and power resources means that IoT finds applications in nearly every field. That kind of systems can collect information from natural ecosystems to buildings and factories. Thereby, finding applications in the fields of environmental sensing and urban planning.



IoT is playing major role in the field of environmental monitoring especially in the disaster management, early warning systems as well as environmental data analytics.

One of the important issues in the

environmental monitoring is water monitoring. In the consumer point of view, water monitoring and its efficient usage is an important utility service that often faced with many challenges. In this paper, we proposed an IoT based water monitoring system in the real time scenario. The sensors in the system measure the level of the water in the tank and data is sent through the cloud server. The user can view the data on the remote dash board. . This system may be used equally efficiently by home-owners as by industrial users and other water utilities. The outline of the paper is as follow. Section 2 discusses the prototype implementation and followed by Section 3 on experimental results. Finally, the paper is concluded in Section 4.

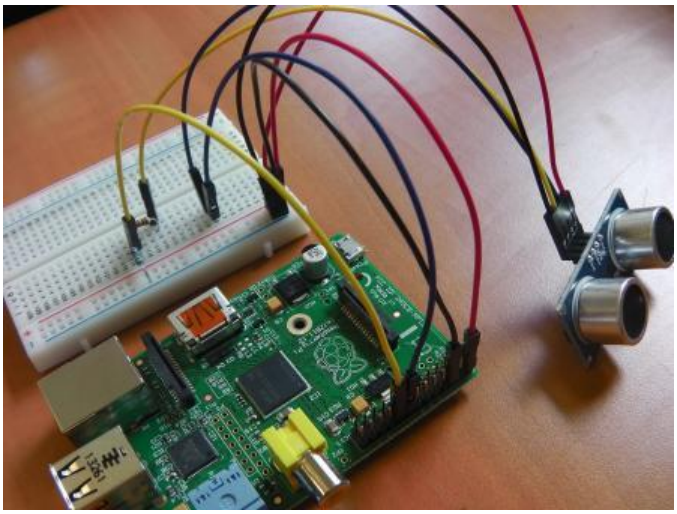
II. PROTOTYPE IPLEMENTATION

IoT based water monitoring system is deployed using ultrasonic sensor. The transmission of the data from the ultrasonic sensor is done through the wireless gateway in the consumer network. The figure2 below shows the system diagram of proposed system.

Ultrasonic distance sensors are designed to measure distance between the source and target using ultrasonic waves. HC-SR04 is a commonly used module for non contact distance measurement for distances from 2cm to 400cm. It consists of an ultrasonic transmitter, receiver and control circuit. The transmitter transmits short bursts which gets reflected by target and are picked up by the receiver. The time difference between transmission and reception of ultrasonic signals is calculated.

The Raspberry Pi is a Quad-Core 64bit CPU, Wi-Fi and Bluetooth. Raspberry Pi 3 is the 3rd generation of Raspberry Pi. It is a credit card sized board computer which is used for multiple applications. Although maintaining the popular board format the Raspberry Pi 3 Model B brings you a more powerful processor, 10xfaster than the first generation Raspberry Pi. Additionally it adds wireless LAN & Bluetooth connectivity making it the ideal solution for powerful connected.

Raspberry pi3 consists of Broadcom BCM 2837 processor. The sensors take the data regarding the level of water in the tank and with the on board Wi-Fi on the raspberry pi the data will be sent to the cloud. The water level gets displayed on the remote dash board of the user. The user can access his dashboard on his mobile. Once the user knows the status of the water level, he can monitor the devices like motor accordingly. The circuit diagram for the prototype of the water level monitoring system is shown in the figure below:



III. EXPERIMENTAL RESULTS

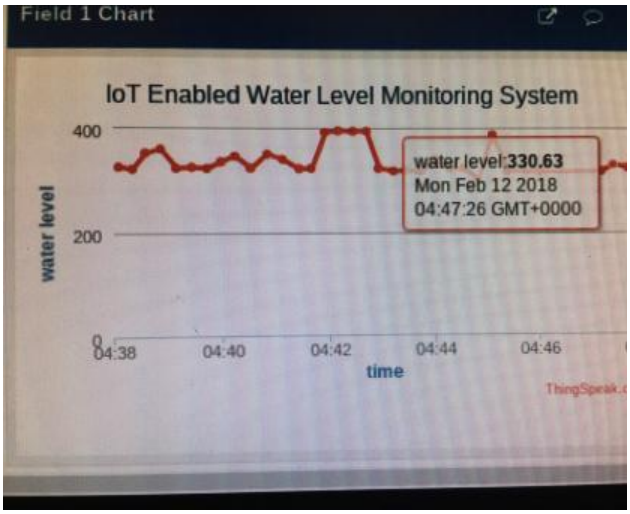
The water level gets displayed on the Thingspeak dash board. "Thingspeak" is an open source Internet of Things (IoT) application and API to store and retrieve data from things using the HTTP protocol over the Internet or via a Local Area Network.

Once Thingspeak account is created and channels

are created in it, we get read API key and write API key. These are necessary to read data from thingspeak or to write data to the thingspeak dash board.

The IoT based water monitoring system's data is analyzed to measure the performance of the system in terms of accuracy and response time. For the system to be effective, the data readings are taken in the real time that is the readings are obtained for every twenty seconds.

The data is displayed in the remote dashboard in the graph format. The water level obtained from the ultrasonic sensor is converted in to centimeters using some sort of calculation in the code. The level displayed on the remote dashboard is indicated in centimeters.



From the above graph, we can see that the water level is indicated on the y-axis and the time is indicated on the X-axis.

As mentioned the water level monitoring system works in the real time, the sensor is displaying the water level for every two seconds. This helps the user in continuously knowing the status of the water level.

IV. CONCLUSION AND FUTURE WORK

In the future, the ultra-sonic sensor could be replaced by precise water level sensor, so that the system can perform more reliably and gives higher accuracy of water level detection reading. Further improvisation would be developing a custom dashboard using mobile app would be ideal for such application in consumer networks.

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