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Water Monitoring System - IoT

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Abstract - *Water is an important natural resource in our life. Water needs to be monitor in real time in order to ensure safe and clean supply of drinking water. For that purpose, IOT (Internet of Things) based water monitoring systems such as tank water level sensing monitoring and water leakage monitoring has been proposed. It describes design of IOT based water monitoring system. The system measures the water level of the main tanks, detects the leakage where ever necessary and water consumed by per flat in the society. The system also detects the flow and turbidity of water. The measured values from the sensors are processed by ESP8266 hall effect sensor and these processed values are transmitted remotely to the Arduino UNO via Wi-Fi module and make the Arduino UNO display the data on a cloud using graphs.*

Key Words: **Arduino UNO, turbidity sensor, Hall effect water flow sensor, ultrasonic sensor, IoT.**

1. INTRODUCTION

Freshwater is limited and essential for industry, agriculture and even human beings. Water supply in urban homes is however not necessarily safe for consumption. Due to old infrastructure, which is poorly maintained, and global warming, continual increase in population puts a strain on the supply of clean water and there is no clean and safe drinking water for the world's population. Periodic manual intervention for metering and maintenance is required and it has the following drawbacks

1) complicated methodology
2) long waiting time for results (leading to delayed detection of and response to contaminants)
3) low measurement precision
4) high cost (labour, operation and equipment)
5) lack of real time monitoring
6) Small number locations are sampled.

Therefore, there is a need for continuous water quality monitoring. We can avoid the water wastage, power consumption and prevent the water for our generation by using water monitoring system. Tank water level monitoring is used to avoid over flowing of water in the tank. Water pollution monitoring can help to detect water pollution, contamination and discharge of toxic chemicals in water. It also checks the quality by using temperature, pH [2] and turbidity [2]. These typical parameters are collected in river/lake water.

2. RELATED WORK

2.1 IOT Based Water Quality Monitoring System [1]

In this system, the complexity reduces and the performance increases by collecting the data of the water parameters such as temperature, co2, pH, water level. The data collected is updated in the web server which can be retrieved from anywhere in the world. It contains GSM modem for transferring data to the cloud. Data is transferred wirelessly using Wi Fi module and also data is refreshed by every 5 sec.

2.2 IoT Based Low Cost System for Monitoring of Water Quality in Real Time [2]

In this system, Raspberry pi is used as core controller and various sensors to monitor the water quality. It connects different sensors to Raspberry Pi to monitor the conditions of water. The data is accessed and processed by Raspberry Pi. The sensor data can be viewed on the cloud using Thing Speak App.

2.3 Smart Water Monitoring System using IoT [3]

In this, the authors present the theory on real time monitoring of water quality and quantity using IoT. The system consists of Arduino, microcontroller, different type of sensors like water flow sensor, pH and turbidity sensor and ultrasonic sensor. The Arduino is the main processor of the system which control and process the data generated by the sensors. The data is transferred to the cloud via internet using Wi-Fi module. The ultrasonic sensor helps to measure the water level and when the water flow reaches a certain level then the water flow can be stopped automatically by closing the water flow in pipe with the help of Arduino. The water flow sensor measures the quantity of water flowing through the pipe. The other sensor like temperature, pH and turbidity sensor measure the water quality and help to determine whether the water is useful for drinking or any agricultural purposes.

2.4 Water Quality Monitoring with Internet of Things [4]

The Atmega328p microcontroller is proposed for both sensor node and the network gateway. The system is designed with double layers PCB for a mobility feature. The small form factor of this system design ensures the fast system installment at the field and easy to be moved to other monitoring area. The pH sensing module and temperature sensor are attached to this prototype by using analog input connectors. The microcontroller of the sensor node prototype is embedded with pH sensing algorithm by using

an Arduino Integrated Development Environment (IDE). As the result of IoT based system implementation, the mobile application is installed in the mobile device to display the real-time data as the first trial run. This trial run is important to ensure the functionality of the proposed mobile application has meet the design requirements.

3. PROPOSED SYSTEM

This proposed system will check the water level of the society tanks from which the water is being supplied to the flats. When the water is being supplied there will be a time when one of the flat will consume less water in 24hr or the force/pressure of water in that flat will be minimum as compared to other flats and from this we will come to know that the pipeline of that particular flat has some defect. This will be using leakage detecting module or sensor which will detect the leakage (if there), also it will be using the pressure sensors for calculating the pressure of the water coming from the main tank to per flat. And will use turbidity sensor to detect the turbidity of water.

Basically, this system will check how much water is consumed by every flat in the society in 24hr and will transfer that data to the cloud and that will display through graphical representation. There will be time when the graph will change and that will represent some defect or leakage in the pipeline

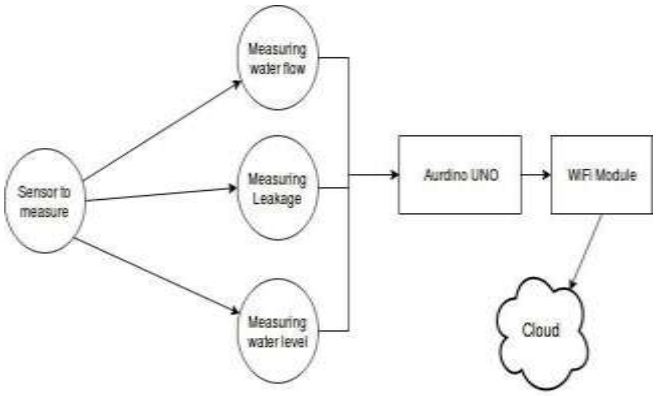

Figure 1: Block Diagram

The different sensors are connected to the Arduino UNO[3]and the data is displayed through the cloud to the Things Speak App[2]. The Ultrasonic sensor[3] is placed at the top of the tank and then a ultrasonic wave is sent downwards towards the water which then reflects back to the sensor and with this we get to know the water level in the tank. The Turbidity sensor is directly placed in the water which emits an infrared light that detects the suspended particles in the water which gives the quality of water. The Hall Effect sensor[3]are attached to the start and end of a pipe. Once the water flows through the start the flow sensor takes the readings and when the water goes through the end the sensor there also takes the readings and then if the two readings do not match then we get to know that there is leakage in that pipe.

3.1. HARDWARE

1) Arduino UNO [5]: Arduino UNO is an open-source microcontroller board based on the ATmega328P and was developed by Arduino.cc. It has a set of digital and analog input/output pins.

Figure 2: Arduino UNO [5]

2) Hall Effect Water Flow Sensor [6]: This sensor sits in line with your water line and contains a pinwheel sensor to measure how much liquid has moved through it. The sensor comes with three wires: red, black and yellow.

Figure 3: Hall Effect Sensor [6]

3) Wi-Fi Module [9]: The Wi-Fi module used in this project is ESP8266. It follows TCP/IP stack and is of low cost. This microchip allows the microcontroller to connect to a Wi-Fi network. ESP8266 has 1MB of built-in flash, single chip devices able to connect Wi-Fi.

Figure 4: Wi-Fi Module [9]

4) Turbidity Sensor [7]: It is an electronic monitoring module specially developed to work with microcontroller platforms Arduino and Raspberry Pi. The Turbidity Sensor is able to detect and verify the quality of the water, making the turbidity measurement.

Figure 5: Turbidity Sensor [7]

5) Ultrasonic Sensor [8]: Ultrasonic sensors are reliable, cost-effective instruments for these applications. It transmits a sound pulse that reflects from the surface of water and measures the time taken for the echo to return to determine the distance from the water.

Figure 6: Ultrasonic Sensor [8]

4. RESULT

Figure 7: Hardware Input

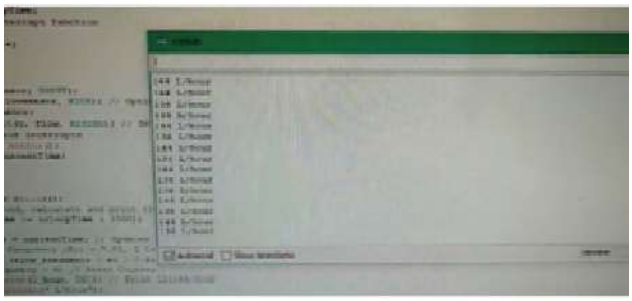

Figure 8: Pressure Output

5. CONCLUSION

IOT based Smart Water Monitoring System works very well. This will be very helpful for the societies where water problems are a big issue. Our project detects the flow, pressure, turbidity and leakage of water which will not only help society to monitor the water but also help save water. For this some sensors are used. The collected data from the all the sensors are used for analysis purpose for better solution of water problems. The data is sends to the cloud server via Wi-Fi module. So this application will be the best challenged in real time monitoring & control system and use to solve all the water related problems.

This system can be modified according to the needs of the user and can also be implemented in various industries where water wastage is the major issue.

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