An efficient Water Level Management technique using IOT

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ABSTRACT

This paper proposes a more efficient water management and monitoring system for water utility to reduce the current water wastage problem. This approach will help utilities operators improve low cost water management systems, specially by using rising technologies and IoT is one of them. The Internet of Things(IoT) could prove to be one of the important methods for developing more utility proper systems and for making the consumption of water resources more efficient. We are making paper on water management system using IoT. In our paper we are using a monitoring device that will look after the water level present in the tank and then it will notify us using sms. In this paper we are using different devices and sensors including the cloud service that will be connected together and integration of those will be an IOT paper.

Keywords: Iot, Water management System.

INTRODUCTION

Our paper is water level management system which is based on IOT. In our paper we are using a monitoring device that will look after the water level present in the tank and then it will notify us using sms. In this paper we are using different devices and sensors including the cloud service that will be connected together and integration of those will be an IOT paper. This project consists of water level detector circuitry integrated with GSM module. Upon reaching the critical water level in the tank, an SMS is sent through GSM module to the technician in-charge for further action. Water tank overflow is a common problem which leads to the wastage of water. Though there are many solutions to it like ball valves which automatically stop the water flow once the tank gets full. But being an electronic enthusiastic wouldn't you like an electronic solution for it? So here is a simple and handy DIY that will guide you to make a circuit which will detect the water level and will raise an alarm upon getting the water tank full or a preset level.

Water Level Indicator Features:

- Easy installation.
- Low maintenance.
- Compact elegant design.
- The Automatic water level controller ensures no overflows or dry running of pump there by saves electricity and water.
- Avoid seepage of roofs and walls due to overflowing tanks.
- Fully automatic, saves man power.
- Consume very little energy, ideal for continuous operation.
- Automatic water level controller provides you the flexibility to decide for yourself the water levels for operations of pump set.
- Shows clear indication of water levels in the overhead tank

LITRATURE REVIEW

Before going into the details of our Intelligent IoT based Water Quality Monitoring system, we will review some of the present system in vogue pertaining to Water Quality.

A. Traditional Water Quality Monitoring

In the traditional water monitoring system, different instruments been used to monitor the quality of water which include “Secchi disks (measure water clarity), probes, nets, gauges, meters”, etc. The traditional method is just not enough to measure water quality and identify any drastic changes in it. This method not only impedes accurate water quality measurement but also at times fails to predict sudden changes in the water system. Hence, Information is also derived from satellite and aerial photographs by observing the surrounding and the changes in specific parameters such as flow of water, color in large overview, direction of water flow etc.

There are three major steps to execute traditional water quality monitoring. These three steps indulge different experts at different levels of the process. The major three steps are as follows:

- Water sampling
- Testing the samples
- Investigative analysis.

In Water Sampling, water samples collected in large mass using various tools. These water samples are then examined in the laboratories. Sampling of water and the analysis are only performed by ISO-certified laboratories. Unreliable results enhance issues concerning pollution when a corrective response cannot be performed within time. Sampling and monitoring tests can be conducted by expert technicians. Further to sampling, Testing is carried out. Testing procedures and parameters been classified into “Physical, Chemical, bacteriological and microscopic” categories.

Physical tests: These indicate properties that are detectable by the senses. They include Color, turbidity, total solids, dissolved solids, suspended solids, odor and taste.

Chemical tests: These tests determine the parameters in water like “pH, hardness, presence of a selected group of chemical parameters; biocides, highly toxic chemicals, and B.O.D”.

Bacteriological tests: This test shows the presence of bacteria, a characteristic of faecal pollution. These tests examine to identify the presence of microbial pathogen in the water that might occur with contamination. The presence of such organisms indicates the presence of faecal material and thus of intestinal pathogens.

Finally the tested water samples are then thoroughly monitored and observed by an expert technician who can read through the lines of the resulted report. They then make an investigative analysis with a parallel consideration of the historical records of the previous water tests. Any similarity of the currently extracted results to the previous records will give way to an intense deliberation for prediction of any unknown changes or hazards to the water quality

B. Technology Based Water Quality Monitoring

In one of the research, Dempster -Shafer (D-S) [1] method employed for detecting the contamination events of drinking water. Autoregressive model (AR) is employed for detecting the water Quality parameters.

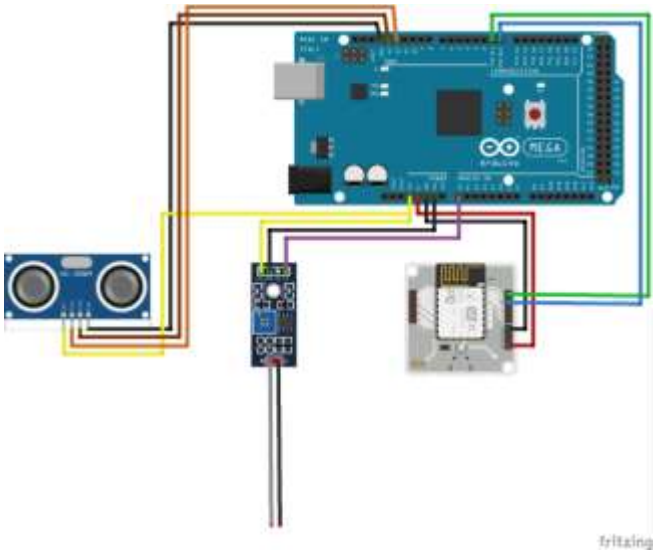
The AR model been employed for predicting the water Quality parameters using automated (on-line) water-quality sensors. Finally, the D-S fusion method searches for anomalous probabilities of the residuals and uses the result of that search to determine whether the current water quality is normal (that is, free of pollution) or contaminated. The major drawbacks of this system are that this method requires lot of parameters for the data collected to determine the water quality. It involves an expert technician to detect the water quality In another research carried out towards Water Quality Monitoring, EcoMapper [2] which is an autonomous underwater vehicle employed. The method maps “water quality, the currents of the water and bathymetry”. There is side scan sonar that can be added on.

The major drawback of this system is that only one person can deploy the EcoMapper which has 8-14 hour life span at the speed of 2-4 knots. This method involves human need and risk of human health underwater in a contaminated environment is very high.

RELATION WITH IOT

In past, the living of individuals has been changed due to the Internet. The IoT has been became an emerging research area because of need of an establishment for connecting things, sensors and other smart technologies [3]. IoT is known as internet’s advanced version. Information related to physical objects can be immediately accessed by IoT and results into novel system having high efficiency and outputs. In IoT , a number of main technologies are there like ubiquitous computing, RFIP, wireless sensor network, cloud computing[3].Cloud computing, a large-scale, low cost processing unit and also an IP based connection mostly used for calculation and storage purpose. The water quality monitoring application contains many distributed monitoring sensors’ array and a wide distribution network. Separate monitoring system is also required in it as told in paper [3].This paper introduces cloud computing techniques for screening values on the internet.

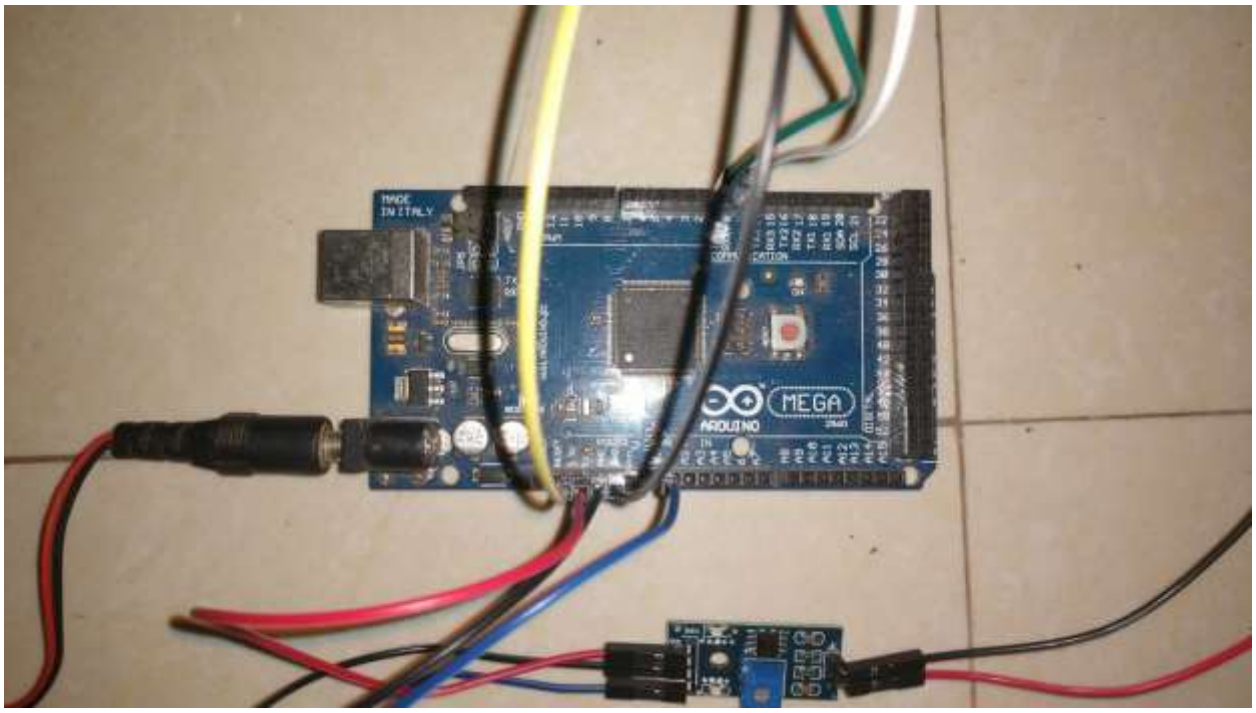
CIRCUIT

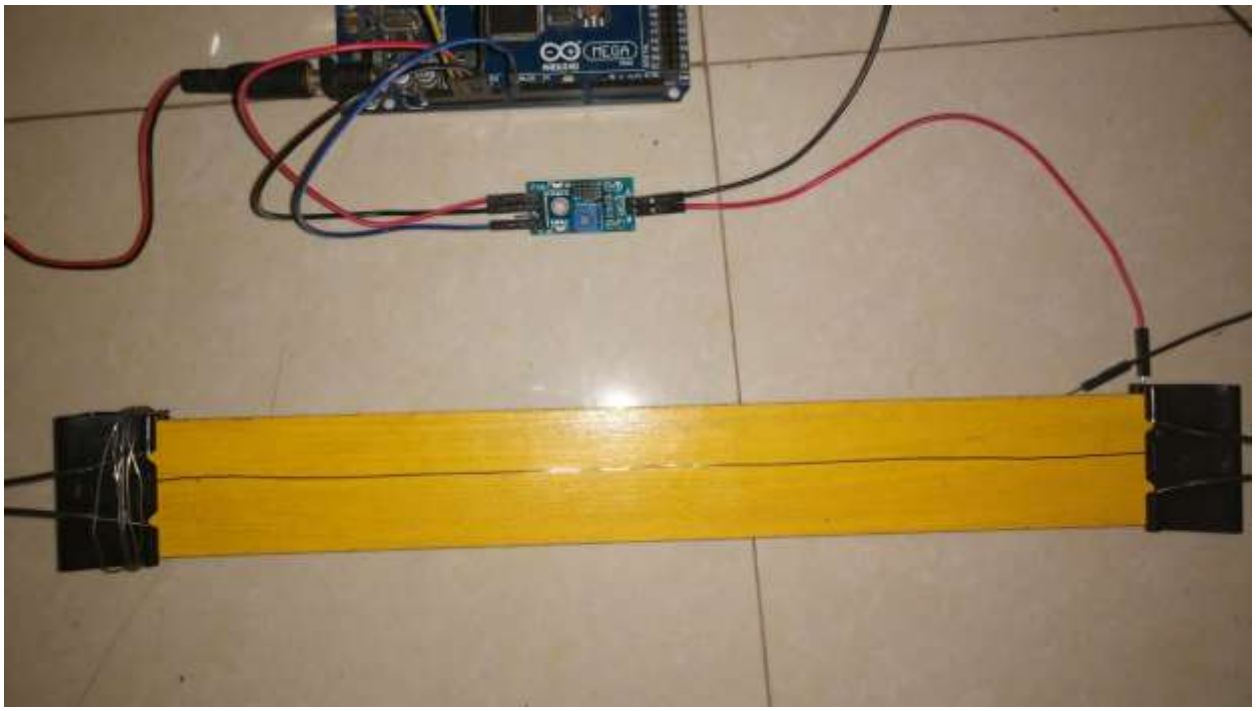


CODE

```
const int analogInPin = A0;  // Analog input pin that the potentiometer is attached to
const int analogOutPin = 13; // Analog output pin that the LED is attached to

int sensorValue = 0;        // value read from the pot
int outputValue = 0;        // value output to the PWM (analog out)

void setup() {
  // initialize serial communications at 9600 bps:
Serial.begin(9600);
}

void loop() {
  // read the analog in value:
sensorValue = analogRead(analogInPin);
  // map it to the range of the analog out:
outputValue = map(sensorValue, 0, 1023, 0, 255);
  // change the analog out value:
analogWrite(analogOutPin, outputValue);

  // print the results to the Serial Monitor:
Serial.print("sensor = ");
Serial.print(sensorValue);
Serial.print("\t output = ");
Serial.println(outputValue);

  // wait 2 milliseconds before the next loop for the analog-to-digital
  // converter to settle after the last reading:
delay(2);
}
```

SCREENSHOTS





CONCLUSION

Water Quality monitoring is very much needed as it is consumed by residents. Traditional water Quality monitoring and some of the technology based Water Quality got lot of challenges. In addition there is no intelligence in existing water Quality Monitoring for analysis and prediction. In our IoT based water monitoring system some sensors are used. Those sensors collect real time data. 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 challenger in real time monitoring & control system and use to solve all the water related problems.

FUTURE SCOPE

- In Future, IoT based Water Quality monitoring system can be extended not just for Storage tank but also for deciding on Ponds, rivers and water pipes too.
- The same work can be extended by looking into other water parameters rather than just PH and TDS and accordingly control the flow of water based on water quality. Lastly the data security and integrity of data need to be secured while transmitting for analysis towards prediction and actuating the valve of water tank and storage area too.
- Smart water management system can also made by integrating it with advance water monitoring system.

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