

# Water Monitoring System Using ARDUINO

<sup>[1]</sup> Anita R Shirur, <sup>[2]</sup> Divya M Kannur, <sup>[3]</sup> Payal Verma

<sup>[1][2][3]</sup> Department of Electronics and Communication Engineering, Dayananda Sagar University, Bangalore, India

---

**Abstract-** Water is essential for everyday life. The quality of water is depleting every day due to human activities. It is required to maintain the quality of water so that it becomes liable for drinking. The scope of this paper is about building a water quality monitoring system which enables us to measure the quality of water. Presently, internet of things (IOT) and smart sensors are being used to monitor, collect and analyses the data. The water monitoring system mentioned in this paper is economical, efficient and reliable. Smart sensors and ARDUINO Uno are used to this system. The results from the analysis of the data, measured by this system are sent to the officials or the authorities so that they can take necessary actions to improve the quality of water if it is found contaminated.

**Index Terms—** Internet of things, Water monitoring system, ARDUINO.

---

## I. INTRODUCTION

Water is an essential natural resource required for the survival of living organisms on the earth. Since fresh water is a limited resource and is getting deteriorated by various human activities, water quality monitoring is required. This is done to keep a check on the water quality i.e., whether it is maintained and restored at the desired level. Water quality monitoring system helps us in measuring various parameters which is responsible for the contamination of water. The availability of good water quality is essential to prevent various water borne diseases. 783 million people do not have access to clean and safe water worldwide. WATER POLLUTION is the contamination of water bodies like lakes, rivers, oceans and groundwater [1, 2]. The water can be polluted in many ways by the pollutants which are directly or indirectly discharged into the water and no proper care is taken to remove these harmful compounds. Because of water pollution, there are deaths and diseases. As estimated 580 people in India die of water pollution related illness every day. The contaminants which are leading to water pollution include a wide variety of chemicals, pathogens and physical changes such as elevated temperature and discoloration. In our project, we collect data from various water parameters such as temperature, turbidity and the level of water.

The system evaluates the quality of water continuously and if any changes are detected it immediately informs the officials so that proper actions are taken to recover the quality of the water. The system proposed by us measures the temperature, turbidity and level of the water. The data collected from the system will be displayed on the system later; this information can be accessed by the officials on their phone/system through internet. In the system which is developed by us measures the quality of water in real time

so, that quick action could be taken. It is affordable, precise and requires less man power.

## II. WAYS OF WATER MONITORING

### A. Thermal pollution

Thermal pollution is caused due to the industrial effluents discharge and also the runoff water. Industrial effluents means industries uses large amount of water as coolant, in power plants and chemical industries they release the heated water into nearby water sources without cooling it appropriately.

Effects of thermal pollution: Reduces the dissolved oxygen [DO] content of the water which eventually kills the organisms that require high level of dissolved oxygen. Causes increased respiration rates and makes the aquatic animals more vulnerable to diseases. Higher temperature increases the metabolic activity of the organisms in the water causing them to consume more food. If the oxygen content reduces means it leads to conditions favorable for anaerobic bacteria which will increase in number. These digest their food by fermentation, which adds to contamination condition of water and air. So, Thermometer can be used for testing the thermal pollution.

### B. Soluble nitrates and phosphates

Sediments cause clogging of water, hence destroying the feeding and spawning grounds of aquatic animals. Clouds the water and reduce the photosynthesis of aquatic plants. They carry pesticides, insecticides and harmful bacteria and disturb the aquatic food webs. Soil eroded from the land in which we find some insoluble particles that will be suspended in the water is the best example for the sediment or suspended matter. And from turbidity test we can measure the amount of impurities in the water.

C. Organic chemicals and water soluble inorganic chemicals High levels of chemicals can threaten human health and harm the aquatic life. The Chemicals are Detergents, oil

**International Journal of Engineering Research in Electronics and Communication  
Engineering (IJERECE)  
Vol 5, Issue 6, June 2018**

spills, toxic metals like mercury and lead. The methods to measure these chemicals are by pH level of the water.

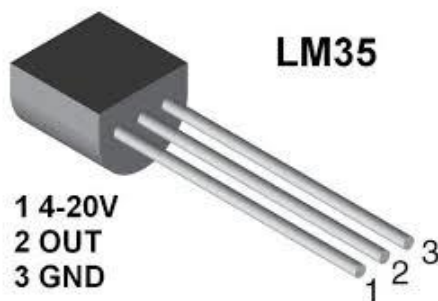
#### D. Genetic pollution

Aquatic systems get destructed by the introduction of nonnative species as they crowd to the native species. Ballast water from ships contains microscopic organisms and early stages of larger plants and animals. Example: Nonnative plants - Hydrilla, Purple loose strife, Eurasian water milfoil. Animals - Rapa whleks, Mute swan.

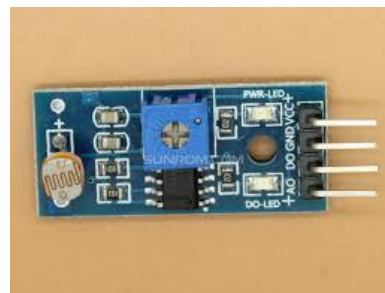
### III. IMPLEMENTATION

In the system which we have developed we are using ARDUINO as our microcontroller and we are measuring temperature, turbidity, and level of water [3]. We collect all these data and the data is displayed on the LCD display. In future we can take the measured data and send it to officials so that they can maintain these parameter in the required range without crossing the limit. And to measure temperature we are using LM35 sensor as shown in Fig. 1. To measure turbidity we use LDR (Light dependent resistor), and for water level we thought of using wires i.e., wires of three different height to tell about the level of water.

LM35 IC is an objective comparative measurement of hot or cold temperature. Temperature sensor is directly connected to microcontroller and example for temperature sensor is LM35 [4, 5]. And we get the measured temperature in degree Celsius. The LM35 operate at -55 to +120 degree Celsius. We connect LM35 to ARDUINO the analog pin A0 of ARDUINO is connected to sensor and ground to ground of ARDUINO and pin 1 of sensor to 5V of ARDUINO. Advantages of using LM35 sensor is to measure temperature as it is directly calibrated in degree Celsius rated for full -55 to +150 range. It is less expensive and operates in 4 to 30volts range and has less self-heating capacity. Because of all these reasons we use LM35 our temperature sensor.



(a)



(b)

**Fig. 1 (a) LM35 temperature sensor IC; (b) LDR Module.**

Temperature of the water is measured and it has large influence on the organisms living in water as it influences biological and chemical process. If the temperature inside water increases more than the required level, the capacity to hold dissolved oxygen reduces. Cold water will have higher dissolved oxygen level than warm water.

#### A. Turbidity

Turbidity is the cloudiness or haziness of a fluid caused by large numbers of individual particles that are generally invisible to naked eyes, similar to smoke in air [6].

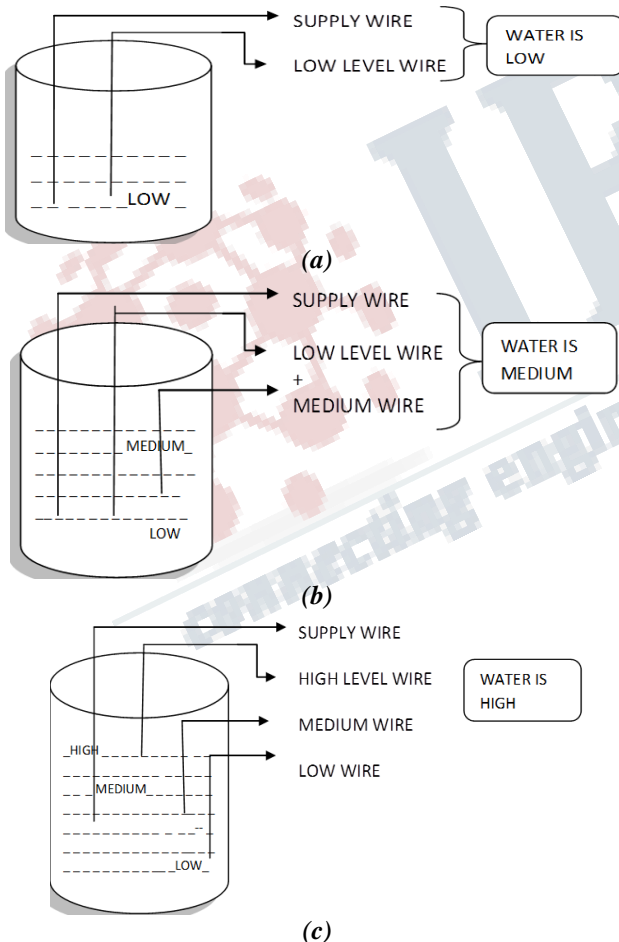
Turbidity is the measure of relative clarity of the liquid. It is an optical characteristic of water and is an expression of the amount of light that is scattered by material in water. When a light is shined through the water sample, higher the intensity of scattered light, higher the turbidity. Materials that cause water to be turbid include clay; slit finely divided inorganic and organic matters. Here in our project, we are using LDR module Fig. 2. LDR is light dependent resistor and it depends upon the amount of light falling on it, if maximum light is falling on it then our system will display water is turbid and in case if light is not completely falling on the sensors then it will show the water is not turbid.

#### B. Water level monitoring

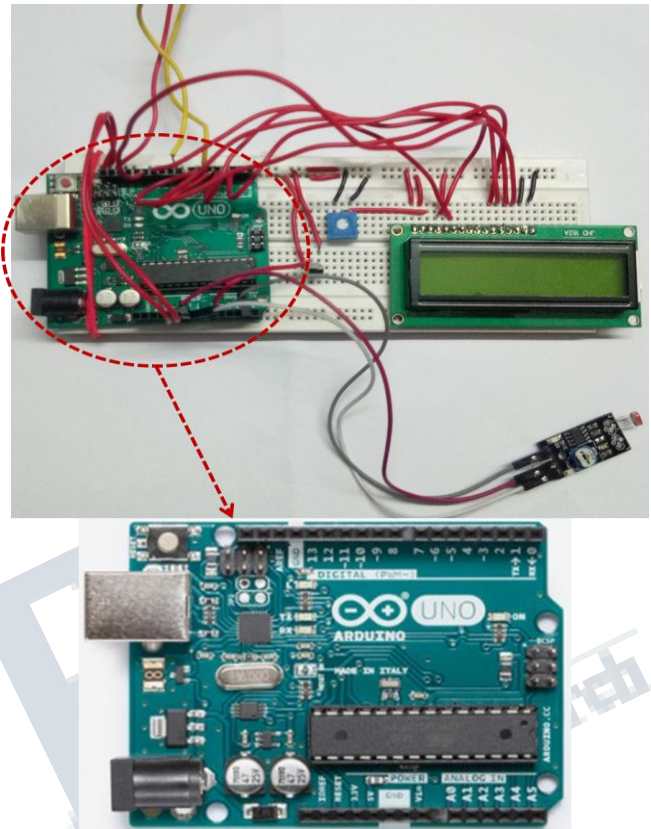
We take wires of 3 different lengths, and keep those wires at 3 different heights and one supply wire will be inserted into the water as shown in Fig. 3. So, in this we measure the level of water in different heights and display "WATER IS LOW". Since the two wires i.e., low level wire and also medium wire both are inside the water it will display that "WATER IS MEDIUM". In last case all the three wires are inside the water so it will display that "WATER IS HIGH". There are so many others ways of measuring the water level. They are ; Floats, Hydrostatic devices, Load cells, Magnetic level gauges, Capacitance transmitters, and Magnetostrictive level transmitters, Ultrasonic level transmitters, Laser level transmitters, Radar level transmitters. In this project we thought of using only the wires to say whether the water is low, medium, high.

**IV. LCD DISPLAY**

After measuring all the parameters we need to display it, to display we are using LCD. A liquid-crystal display (LCD) is a flat panel display. Display units are the most important output devices in embedded project and electronics products. 16\*2 LCD is one the most used display unit. 16\*2 LCD means that there are two rows in which 16 characters can be displayed per line, and each character takes 5\*7 matrix space on LCD. We can divide it in five categories power pins, control pins, contrast pin, data pins and backlight pin. Here in our project we are finally displaying the output on the LCD. And the data which is displayed can be used for the further references to maintain all these parameters in the required level. The same data can be viewed either in your mobile or system. And the collected data will go to the officials who are the in charge of that water body so that they take care or maintain the parameters to required level.



**Fig. 2 Water level monitoring at: (a) Low level; (b) Medium level; (c) High level.**



**Fig. 3 Printed circuit board with LCD.**

**V. RESULTS**

We have identified a suitable model that consists of sensors and ARDUINO microcontroller. The functionalities are as shown in the Fig. 3. In this system, we use ARDUINO Uno with temperature sensor and turbidity sensor along with the LCD display after sensing the data from the sensors placed in the area of interest, it is sent to web server.

**VI. CONCLUSIONS**

Monitoring turbidity, temperature and level of water is inexpensive and does not require any labor. Water monitoring system is economical, convenient and reliable. The operation is simple. Variations and improvements can be done by changing the relevant software programs and by inserting more sensors. The system can be used to monitor the quality of water in industrial and agricultural production companies. It has wide spread applications and extended value. To implement this, sensors should be placed in the environment to collect measure and analyze the data. By deploying sensors in the environment, we can bring the

**International Journal of Engineering Research in Electronics and Communication  
Engineering (IJERECE)  
Vol 5, Issue 6, June 2018**

---

environment to real life and the solutions can be drawn easily.

#### VII. ACKNOWLEDGMENT

The authors would like to acknowledge Dean Dr. A. Srinivas, Dayananda Sagar University, Bangalore for his valuable guidance. They would like to thank Dr. H.L Viswanath, Head, Department of Electronics and Communication Engineering for their co-operation and support.

#### REFERENCES

- [1] Ayob Johari, Mohd Helmy Abd Wahab, Nur Suryani Abdul Latif, M. Erdi Ayob, M. Izwan Ayob, M. Afif Ayob, Mohd Norzali Haji Mohd . Tank Water Level Monitoring System using GSM Network . Ayob Johari et al, / (IJCSIT) International Journal of Computer Science and Information Technologies, Vol. 2 (3), 2011, 1114-1120.
- [2] R. M. Bhardwaj, Water Quality Monitoring In India- Achievements And Constraints Iwg-Env, International Work Session on Water Statistics, Vienna, June 20-22, 2005.
- [3] Zulhani Rasin and Mohd Rizal Abdullah. Water Quality Monitoring System Using Zigbee Based Wireless Sensor Network. International Journal of Engineering & Technology IJET-IJENS Vol:09 No:10.
- [4] Rashmi Choudhury , Purabi Kalita. Water Quality Monitoring Using Wireless Sensor Network, Department of Information Technology, Gauhati University.
- [5] Sayan Kumar Swar, Susmita Das, Dibyendu Sur, Soumya Paul. Automatic Liquid Level & Temperature Monitoring and Controlling using LABVIEW and ARDUINO. IOSR Journal of Electrical and Electronics Engineering (IOSR-JEEE) e-ISSN: 2278-1676, p- ISSN: 2320-3331, Vol. 11, Issue 2 Ver.II (Mar. – Apr. 2016), PP 56-60.
- [6] Rohit Kamble, Sagar Kakade, Abhijeet Mahajan And Akshay Bhosale. Automatic Water Quality Monitoring System Using Arduino. Scientific Journal Impact Factor - 3.605 by SJIF e- ISSN: 2456 – 2084.