Water Monitoring through TDS and PH Measurement

TINKERING LAB

PROJECT – 7

Group members:-

- 2021meb1284@iitrpr.ac.in - Guguloth Krishna
- 2021meb1289@iitrpr.ac.in - Jakkam Parnika
- 2021meb1297@iitrpr.ac.in - Mitta Vasavi Srija
- 2021meb1315@iitrpr.ac.in - S. V. Vasista
- 2021meb1328@iitrpr.ac.in - Surkanti Sai Sahasra
- 2021meb1369@iitrpr.ac.in - Gugulothu Sri Divya

About Project:

1. Introduction:

Measuring and analyzing water quality to evaluate its suitability for different applications is the process of "water monitoring." Total Dissolved Solids (TDS) and pH levels are two major elements that are frequently assessed in water monitoring

Turbidity means the state of being clouded or opaque or we can say the amount of sedimented contents in a solution we can also say the suspended particles that are present in a solution. These makes the water dirty and unfit for use so its necessary for us to measure the turbidity of water to monitor its quality .

2. Objectives:

a. Our project's main aim is to create a system in which we will be measuring the pH and TDS levels in water properly. According to those levels,we can segregate usage of water for different purposes.

i. **Access water quality**: Turbidity and pH measurements provide information about water quality by measuring the concentration of dissolved solids and acidity.

ii. **Detects changes in water quality**:Turbidity and pH measurements can assist in the detection of changes in water quality over time. If the readings deviate from the normal range, it could be due to the presence of new contaminants or other factors influencing water quality

3. Why this project?

a. This Project will help in determining the water quality in which we will get to know the chemical composition,acidity and basicity of the different samples of water.

b. The Different applications like hydroponics,aquaculture,drinking water,agricultural water and industrial water.

i. For clean water turbidity value is ideally kept below 1NTU and Ph is 6.5-8.5
ii. For Rainwater turbidity is around 6-19 NTU and Ph s 5.0-5.5
iii. For Irrigation use the Turbidity is not a big worry (it depends on the nature of suspended particles)and Ph value should be and 6.5-8.4
iv. In Aquarium the suitable value of Turbidity and Ph are ideally 1NTU and 6.5-8

4. *Turbidity sensor Sensor:-*

It indicates the amount of solids suspended in water or can be technically termed as **suspended solids** that are not dissolvable in water. Which in the end dictates that the higher the Turbidity the less clean is the water . This can also be applied to domestic water, **hydroponic**(Hydroponics is the technique of growing plants using a water-based nutrient solution rather than soil) and other fields of water quality testing .

To test the amount of total dissolved solids we use the scattered and absorbed light which decreases as turbidity increases in water in this project . As we all know that the water that has impurities of soil particles scatters more light depending on the size of the particles .By measuring the remaining light by photo detector we calculate the Turbidity of water.

By this principle we know that the turbidity of water depends on the scattered light and the size of suspended particles present in the sample so the pure the water the lower the scattering of light.

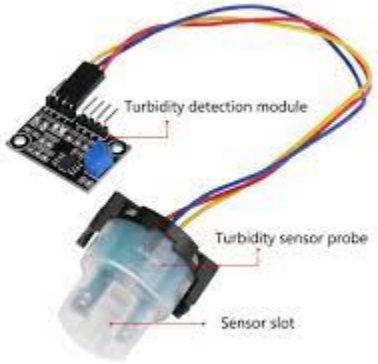
5. *PH Sensor :-*

In contrast, pH is a measurement of how acidic or alkaline water is. The neutral pH value is 7, and the pH scale goes from 0 to 14 . Water that has a pH below 7 is said to be acidic, and water that has a pH over 7 is said to be alkaline. The solubility of minerals and compounds in the water as well as the wellbeing of aquatic organisms can both be impacted by the pH level of the water.

To measure the pH of a solution we use the potential difference between the reference systeme and the measuring system . **Measuring system** it is the solution present in the inner glass tube of KCl having the sensitive glass bulb at the bottom and have AgCl wire as electrode and the **reference system** is the solution present in outer glass tube with same KCl but is isolated from the exposure of pH sensor and have AgCl as the electrode the junction protect the reference system to the medium to be measured without disturbing the electrical connection between them.

6. Materials Required:

- **a.** ESP32
- **b.** Turbidity sensor module
    - i. Turbidity sensor probe
        1. Waterproof Turbidity sensor Probe
    - ii. Signal connector board(amplifier board):
        1. Specifications :
            a. input: 3.3/5V
            b. Output voltage : 0 to 2.3V
            c. Working Current: 3 ~ 6mA
            d. Turbidity Measurement Range: 1 ~ 1183 NTU.
            e. Power indication LED
            f. Analog Signal, easy to implement



- **c.** PH sensor
    - i. pH electrode probe BNC connector
    - ii. Signal processing board
- **d.** Jumper wires
- **e.** Bread board

f. Display
g. Resistors - 2 (1000Ω)
h. Distilled water - 250ml

7. Methodology:

a. Here, in this project,we will collect different samples of water from different places and measure the values of their pH and ppm with the help of pH sensor and TDS sensor.
   i. The connections should be in such a way that an ESP32 microcontroller can be used to measure the ppm of a water sample with the help of a TDS sensor and measure the pH of water using a pH sensor.
   ii. The electrical signals from the TDS sensor and pH sensor are read by the ESP32 micro controller.

b. The process for using TDS and pH sensors to assess water quality can be divided into many steps:
   i. **Turbidity Measurement**: Using a Turbidity sensor, determine the Turbidity of different water samples. Before each measurement, thoroughly rinse the sensor with clear/distilled water to prevent contamination. Keep track of the Turbidity readings
   ii. **pH measurement:** Using a pH sensor, we determine the pH levels of the water samples. Calibrate the sensor with pH buffer solutions before each measurement. Before and after each measurement, rinse the sensor with deionized water

8. Conclusion and Future perspectives:

We can conclude that it is important to monitor the Turbidity level and pH of water used for different purposes. When a water source has high level Turbidity or low pH, it is likely that it is harmful and we should perform water treatment.

So Turbidity and pH sensors can both be integrated into water monitoring systems to provide real-time water quality data. This data can be used to identify potential water quality issues and make the necessary adjustments to maintain safe and healthy water conditions.The system is reliable and easy to maintain and it can be extended to measure pollution as well.

9. References :

a. Basic structure of TDS circuit - **pH sensor**

10. *Group Members Contribution:*

S.No	Name	Entry Number	Work
1	Bommiditha Jyothsnavi	2021MEB1277	Report
2	Krishna	2021MEB1284	Circuit and code related to pH sensor
3	Jakkam Parnika	2021MEB1289	Circuit and code related to Turbidity sensor
4	Mitta Vasavi Srija	2021MEB1297	Circuit and code related to pH sensor
5	S.V.Vasista	2021MEB1315	Circuit and code related to Turbidity sensor
6	Surkanti Sai Sahasra	2021MEB1328	Overall code and some part of report
7	Gugulothu Sri Divya	2021MEB1369	Circuit