❑ Problem Statement

Fresh water is necessary for the survival of all living creatures on Earth. Our bodies are made up of about 60% water and we cannot survive more than a few days without water. We use water for drinking, industrial works, cleaning etc. But polluted water may cause harmful disease even it may lead us to death. So it is very important to know if the water we are using is safe or not.

Our project is to make a system that can be used to track the water quality in a smart way .This system will help us to monitor water quality real-time. This system uses the TDS sensor that will measure the electrical conductivity of the water and the concentration of dissolved solids in water e. g. minerals, salts, metals and other particles. This system also includes a DS18B20 temperature sensor to measure the water temperature. Water temperature can impact various factors, such as the solubility of minerals and the growth of microorganisms. Our system can be further enhanced to log the TDS, EC, pH and Temperature readings over time. By storing this data, we can analyze trends, detect changes in water quality and identify potential issues such as contamination or variations in TDS level.

❑ Purpose of the Project

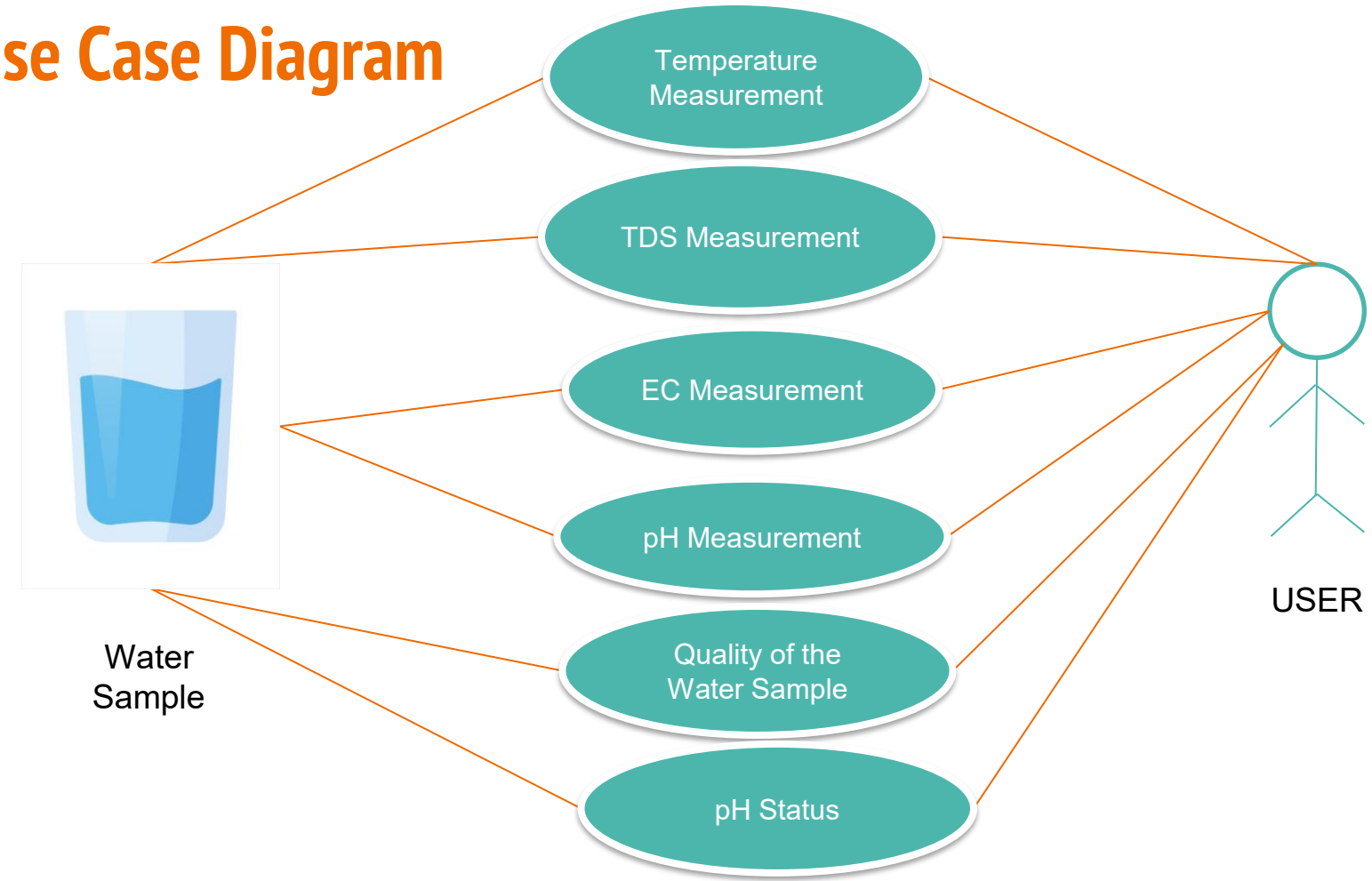
Our purpose of this project is to smartly assess the water quality without the need for complex analysis or external devices and to achieve it. We want to create a system that measures Total Dissolved Solid (TDS), Electric Conductivity (EC), monitors the temperature, measured the pH and displays the results on an LCD screen, allowing for water quality assessment and analysis.

❑ Main Features

1. **TDS Measurement:** The TDS sensor measures the concentration of dissolved solids in water. This includes minerals, salts, metals, and other particles. By measuring the TDS level, you can assess the overall quality of the water. Higher TDS values may indicate a higher concentration of impurities, while lower values may indicate purer water.
2. **Electrical Conductivity (EC) Measurement:** The TDS sensor also measures the electrical conductivity of the water. EC is directly related to the TDS level because dissolved solids in water increase their conductivity. By measuring EC, you can gain insights into the water's ability to conduct electrical current, which indicates its quality.
3. **pH Measurement:** The device also includes a digital pH meter sensor to measure the water pH. pH is really a measure of the relative amount of free hydrogen and hydroxyl ions in the water. pH is an important indicator of water that is changing chemically.

4. **Temperature Monitoring:** The device also includes a DS18B20 temperature sensor to measure the water temperature. Water temperature can impact various factors, such as the solubility of minerals and the growth of microorganisms. Monitoring temperature allows you to account for temperature variations when analyzing the TDS and EC measurements.
5. **Real-time Display:** The 16×2 I2C LCD display provides a convenient way to view the TDS Value, EC, and water temperature in real time. With the readings displayed on the LCD, you can quickly assess the water quality without the need for complex analysis or external devices. There are 2 LEDs to indicate the quality of the water. If the water is not usable and unsafe for using then, the Red LED will on and if the water sample is safe then the Green LED will on. Thus it is very easy to monitor the quality of water sample.

Use Case Diagram



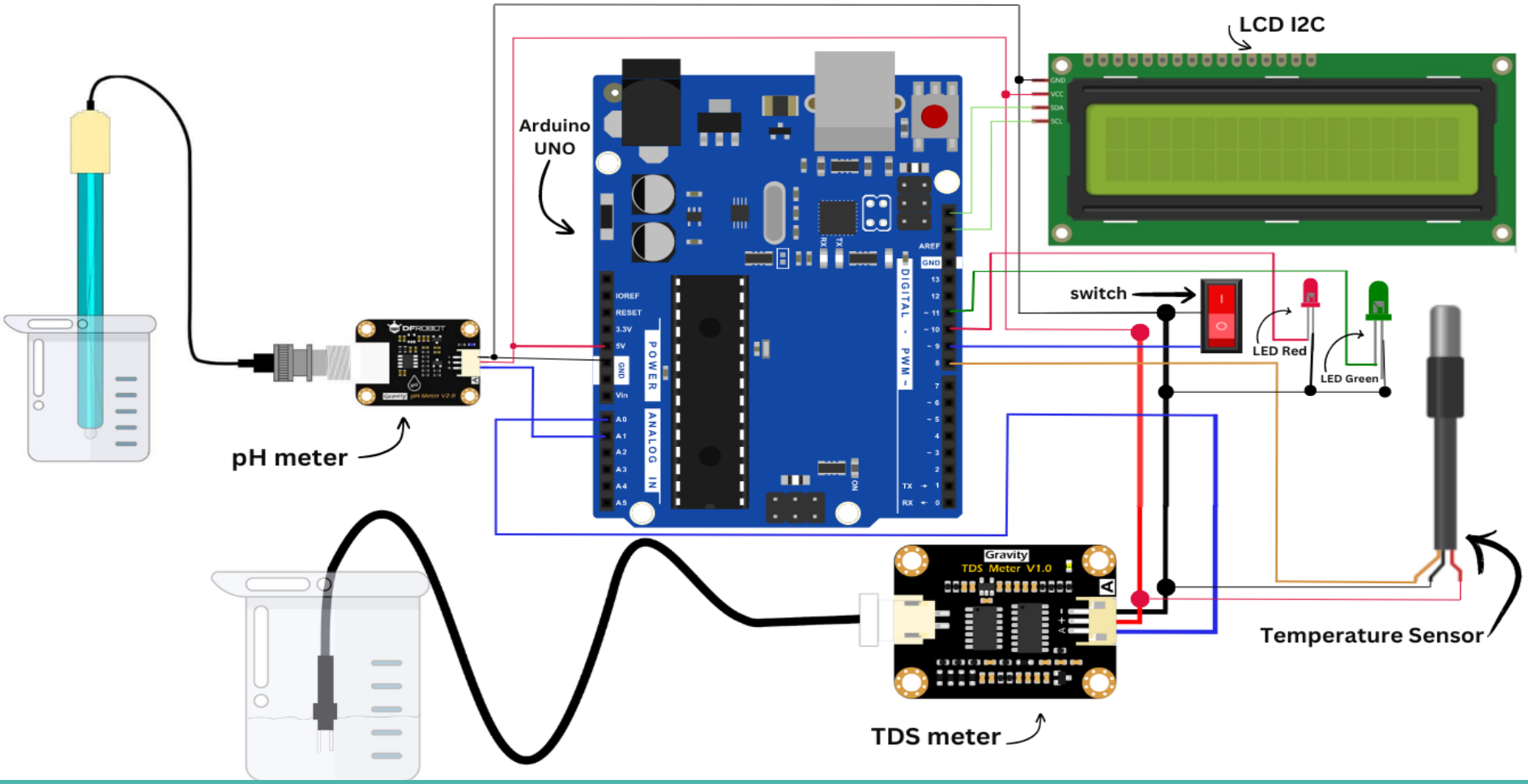
Methodology

To implement our project , we need following tools & devices-

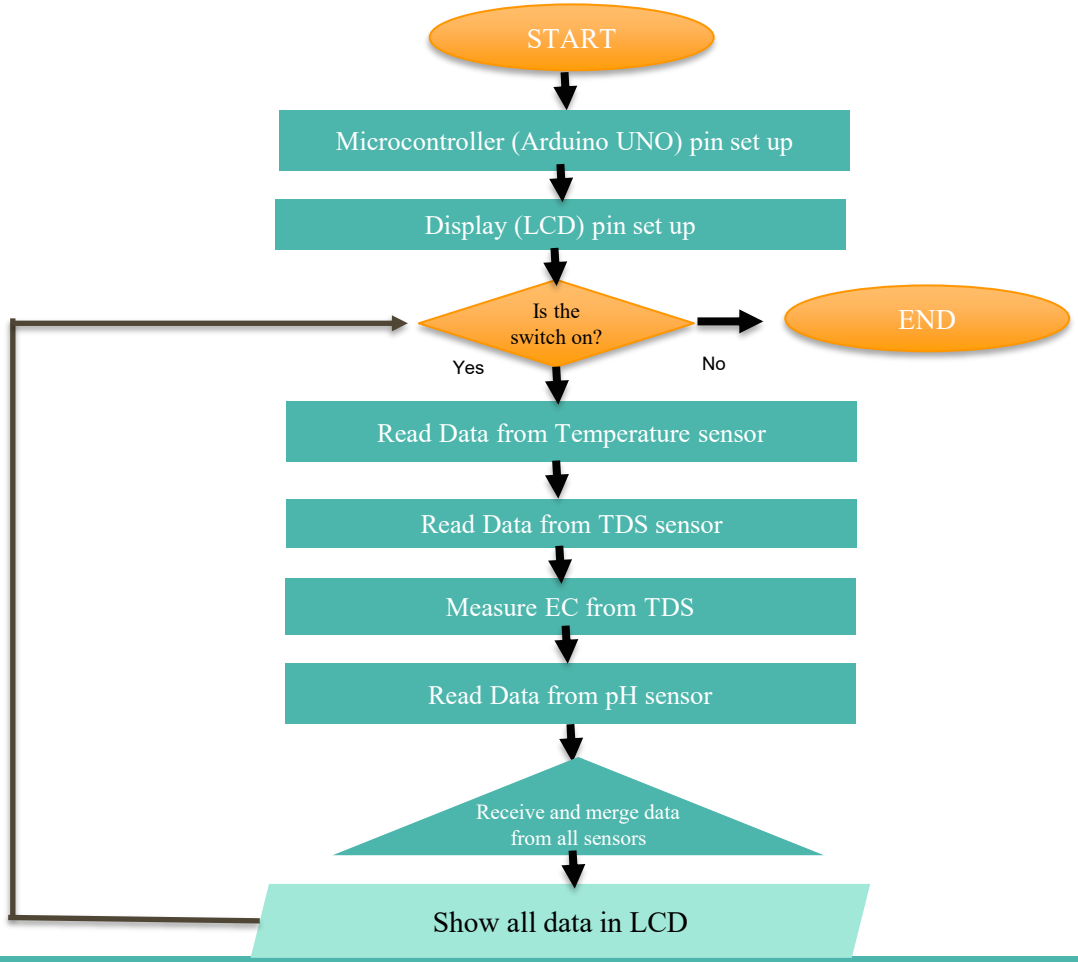
1. Arduino UNO
2. TDS Sensor
3. DS18B20 Temperature Sensor
4. pH meter
5. 16x2 I2C LCD Display
6. Breadboard
7. Jumper Cables
8. Switch
9. Red LED
10. Green LED

Now complete the connection according to the circuit:

Circuit Diagram



Work Flow Diagram



References

1. S. B. Tsai, M. F. Chien, Y. Xue, L. Li et al., “Using the fuzzy dematel to determine environmental performance: a case of printed circuit board industry in Taiwan,” *PLoS One*, vol. 10, no. 6, Article ID e0129153, 2015.
   View at: Publisher Site | Google Scholar
2. J.-H. Lee and J.-E. Oh, “A comprehensive survey on the occurrence and fate of nitrosamines in sewage treatment plants and water environment,” *Science of the Total Environment*, vol. 556, pp. 330–337, 2016.
   View at: Publisher Site | Google Scholar
3. Lv, B. Hu, and H. Lv, “Infrastructure monitoring and operation for smart cities based on IoT system,” *IEEE Transactions on Industrial Informatics*, vol. 16, no. 3, pp. 1957–1962, 2020.
   View at: Publisher Site | Google Scholar
4. An, H. Li, L. Wang, Z. Wang, J. Ding, and Y. Cao, “Compensation mechanism for urban water environment treatment PPP project in China,” *Journal of Cleaner Production*, vol. 201, no. 1-1166, pp. 246–253, 2018.

View at: Publisher Site | Google Scholar

Thank You!