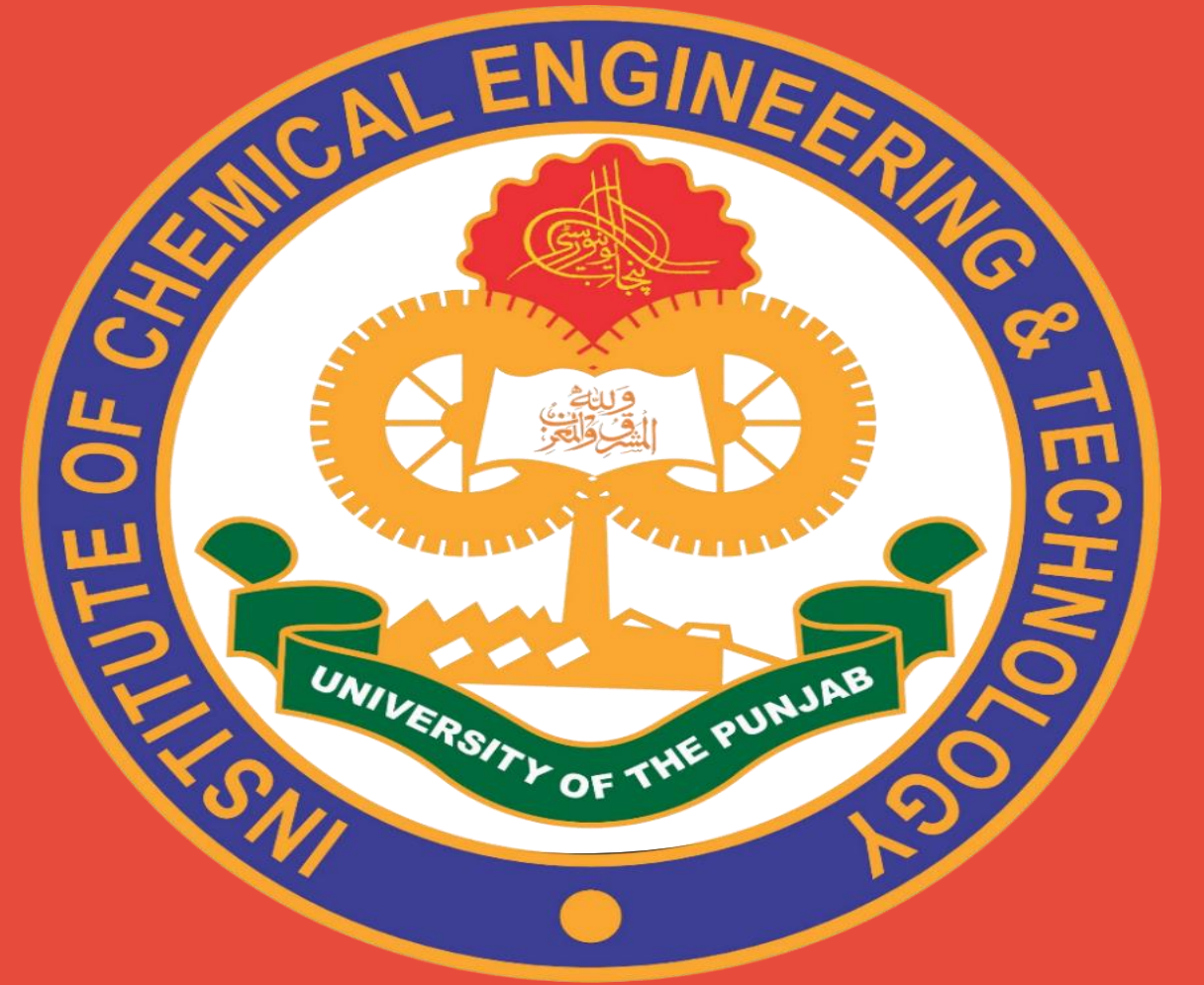




TDS Sensor & Arduino Interfacing for Water Quality Monitoring

Presenter: Muhammad Furqan Mughal

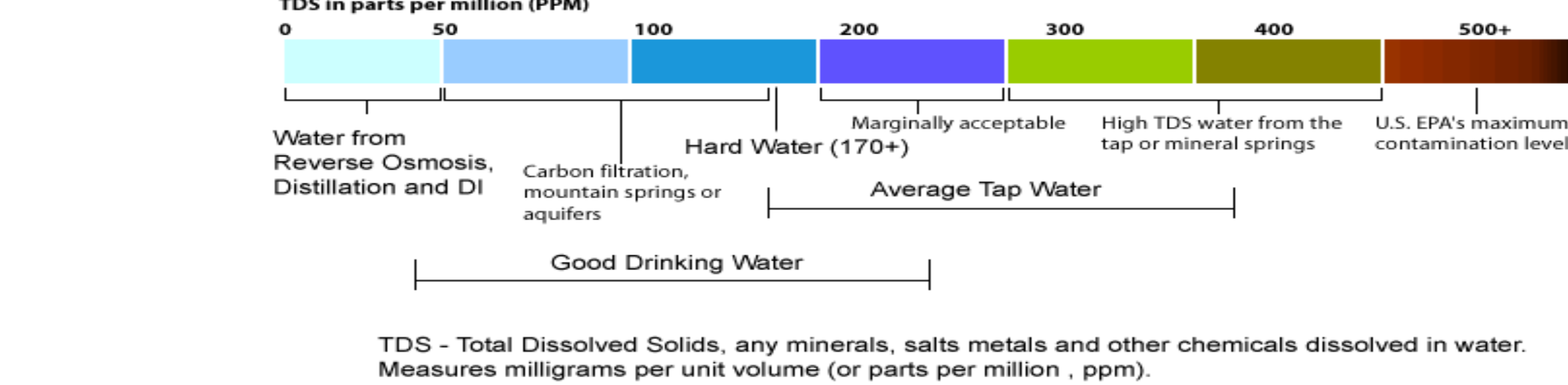


Abstract

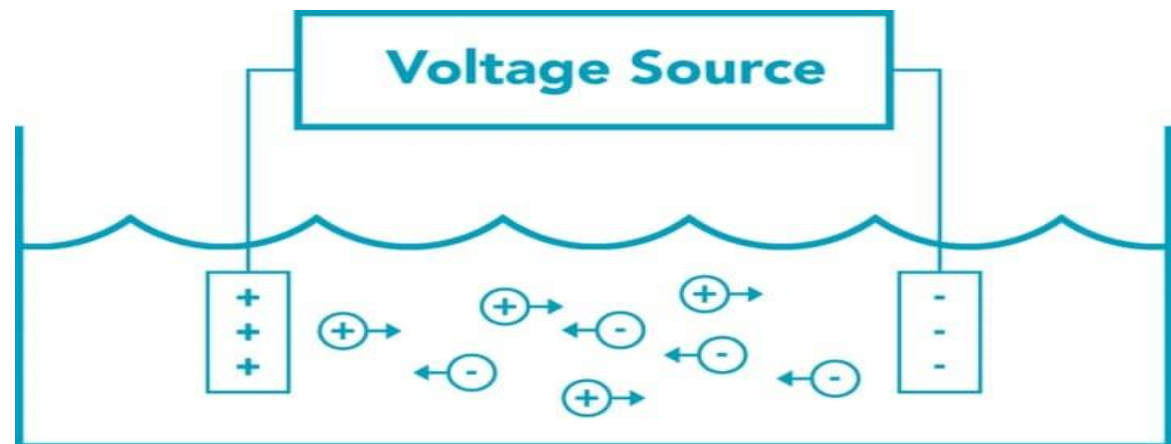
Water is a key ingredient for the future of mankind. Its diverse applications ensures that its demand is still constant. The main water source include massive water bodies such as dams, streams, and the ocean itself.. So that, monitoring is very crucial to practice. Its consistency ensures that it is suitable for human use. Current water quality test in conventional laboratories is frequently carried out but this is time-intensive and vulnerable to inaccuracies. Therefore, the objective of this paper is to study the viability of deploying an Arduino-based water quality monitoring sensor device. A basic prototype made up of a microcontroller and several connected sensors were used for weekly on-site testing at several regular intervals. The device is working efficiently but dependent on human support and susceptible to data inaccuracies. However, the framework offers a firm basis for potential extension projects under the same group to make the system more accessible internet of things (IoT).

Introduction

TDS means how many milligrams of soluble solids are absorbed in one liter of water. The higher the TDS value, the more soluble solids are dissolved in water and more cleaner the water is. The key aims of this study is to improve IoT devices, as discussed in the abstract, multiple sensors are required to be used for communication link, storage, and processing capability, to power the system, etc. To track river/stream water quality and to recognize triggers and factors which will contribute to water quality problems in the area. TDS means how many milligrams of soluble solids are absorbed in one liter of water. The higher the TDS amount, the more soluble solids are dissolved in water and the cleaner the water.



Inline TDS Meter tests the tap water and some other water supplies, including water from the TDS purification devices. This is also ideal for measuring Reverse Osmosis systems efficacy, Total Dissolved Solids (TDS) in liquids, etc.

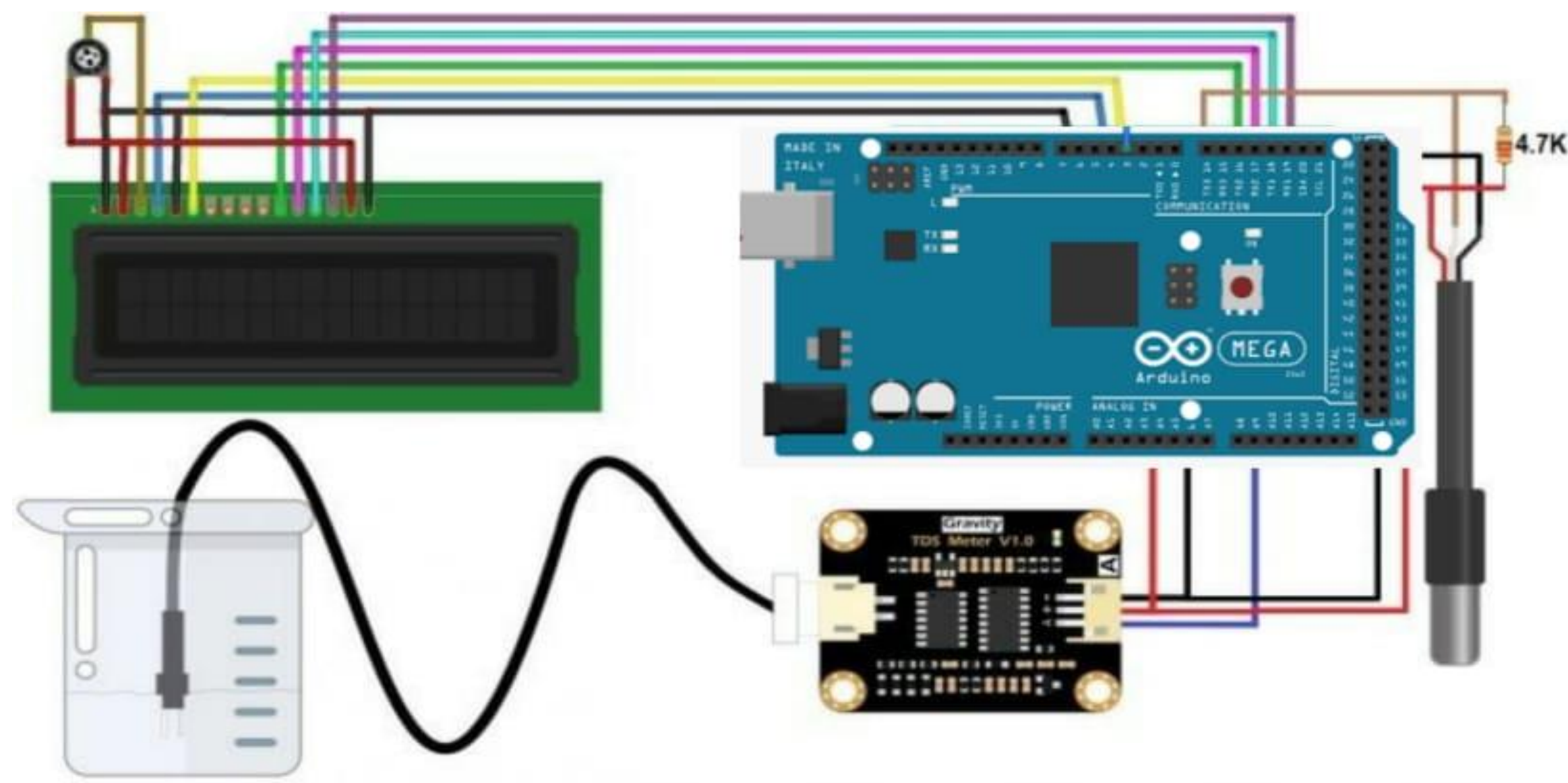


Motivation

Utilizing TDS measurer to ensure safe and clean water for the society, was our motivation. As we know that water quality is an essential problem to tackle. So, measuring the solid content in water to check whether it is safe for humans or not is our primary goal. This idea came to our mind, seeing the waterborne diseases that are more common in industrial areas. According to a report, the drinking water in most areas of Faisalabad found to be in more saturated with suspended particles. To minimize this issue, a TDS sensor can be used to check the water quality for drinking purposes, so that people can be prevented from such diseases.

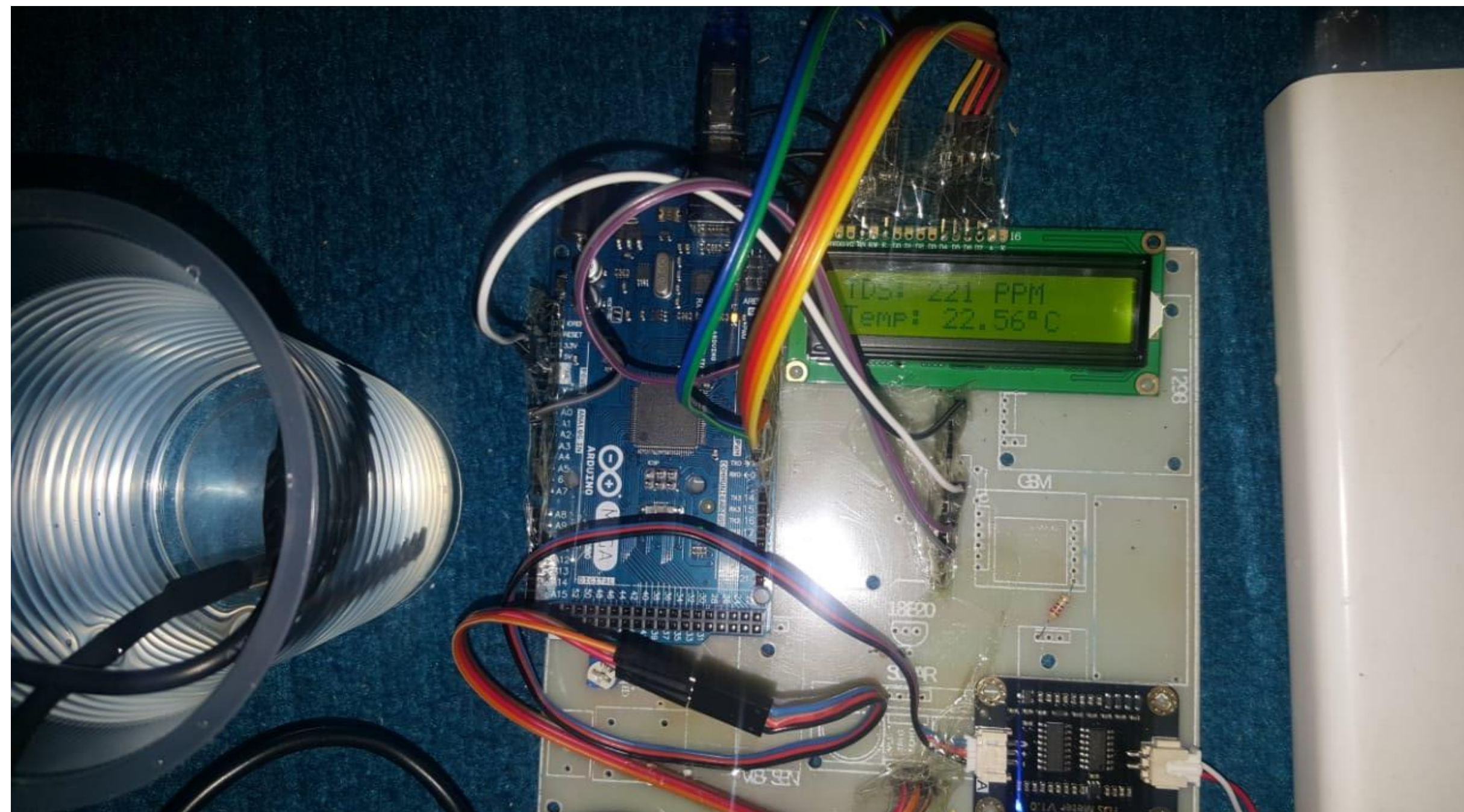
Methodology

Now let us elaborate how to **interface TDS Sensor with Arduino**. The circuit diagram is given below.



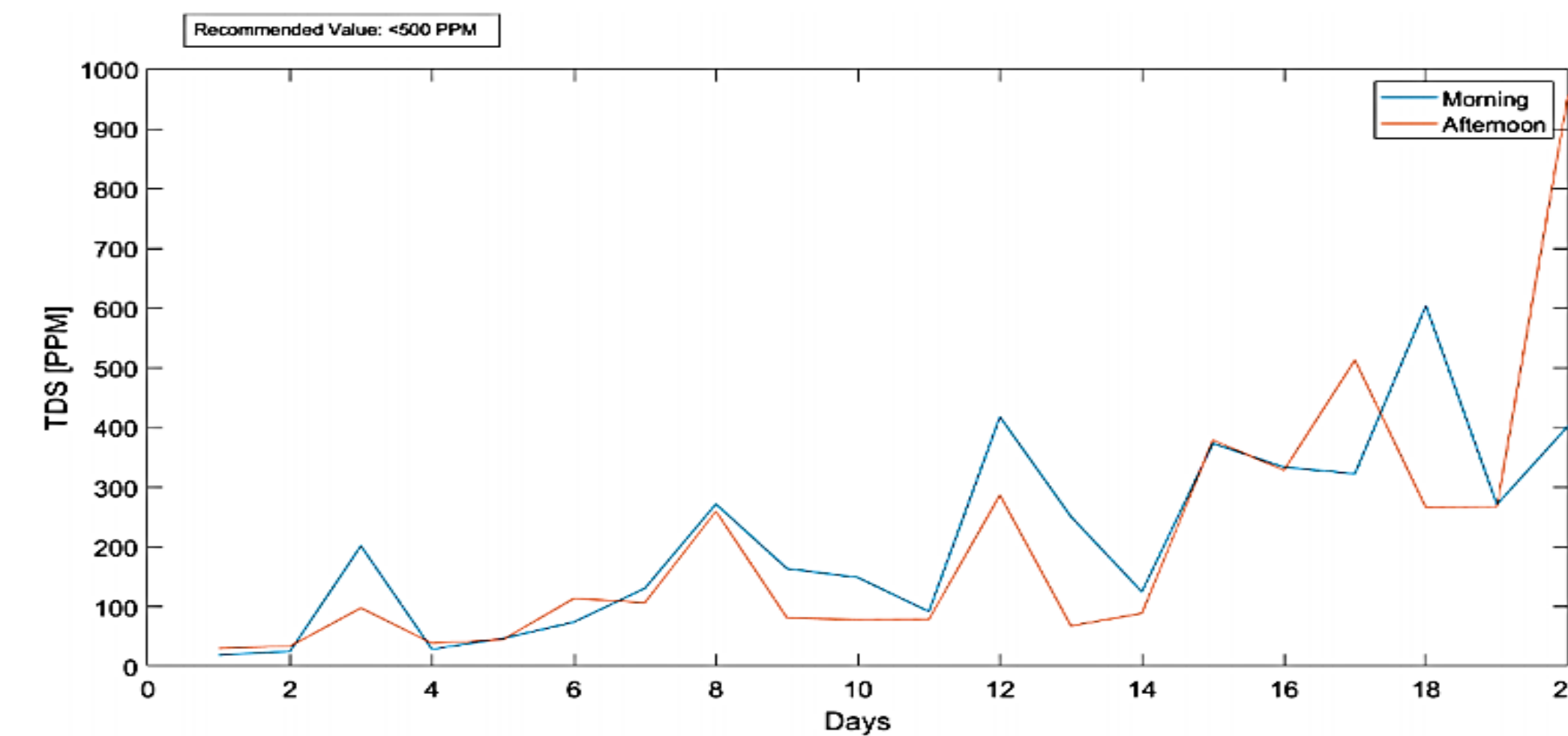
The connection between the TDS sensor and Arduino is very easy. Connect the VCC to GND with Arduino 5V & GND. Connect your analog pin to an Arduino analog pin. In my case, I used Arduino Analog Pin A1.

The main component of the monitoring system is the Arduino MEGA Board. It is a microcontroller board based on the ATmega328 with three essential features:1. A total of 6 analog input pins labelled A0 to A5 to allow up to a maximum of 6 analog sensors for direct connection with the Arduino.2. A total of 2 power supply pins labelled 3.3 volts and 5 volts with in-built voltage regulation to provide power to sensors.3. A USB plug can be used in conjunction with a USB cable to connect with a microprocessor.



Results

This section evaluates the efficiency of the proposed system in terms of accuracy and continuous operation in real-time. Also, shows the working of the system design that was the subject of two experiments, the first of which involved measuring the quality parameters of standard and well-known quality solutions to determine measurement accuracy, while the second involved addition to pre-determined volumes of clean water and measuring/recording the specific amount of contaminants (such as, salt, soil, and acidic lemon juice). When some soluble ion solution such as salt is added to the solution, the conductivity increases and so the value of TDS can increase. I have added 2 spoons of salt in the picture below and stretched it. The value of TDS immediately increased.



Graph shows the growing trends in dissolved river solids throughout the sampling era. The association between total dissolved solids, conductivity, and temperature must be explained to start illustrating this pattern. Complete dissolution of solids and conductivity are directly proportional. Pure water has no electric charge, but water can produce minerals and salts. Any source of water with dissolved salts and minerals can provide readability.

Testing Site



Conclusion

The data could be useful in determining river health by calculating the Water Quality Index (WQI) or other associated indices. Finally, the testing environment and schedule could be changed. The river health assessment and monitoring system validation, gives more frequent data readings that must provide the most necessary additional information and accuracy. This project explains the design and implementation of a low-cost monitoring system based on Arduino Mega open-source hardware platform. Calibrating the quality sensors required for accurate results was an essential step in the implementation process. The sensors were calibrated using standard SSMO maintenance laboratory calibration buffer solutions. Results have shown that the proposed system can be measured directly, delivering reliable measurements. Furthermore, the results showed that the proposed monitoring system can continuously monitor the relevant water quality parameters. We also predicted the effect of temperature variation on other quality parameters using numerical analysis techniques and demonstrated that EC is proportional to the total dissolved solids (TDS).While the study shows success in designing a low-cost water quality monitoring system. Some constraints are the number of quality parameters monitored and the system's ability to detect specific water contaminants. This work raised many questions that need further investigation. We recommend further work on the following problems: the effect of specific contaminants on water quality parameters, the development of algorithms to detect contamination events, the improvement of system monitoring capabilities using modern ICT technologies such as internet of things (IoT) and wireless sensor networks (WSNs).

Acknowledgements

Primarily we would like to thank Allah Almighty to enable us to complete this project with success. We would then like to thank our respectful teacher **Dr. Mujtaba Ikram** whose valuable guidance has helped us patch this project and make it a complete proof of success. His suggestions and instructions have served as the primary contributor to the competition of this project.

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