



Automated Monitoring System for Water Quality

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Introduction

Problem statement:

Home owners face a problem with measuring the quality of the water in the home tank. So for home owners, who needs to read the quality without any difficulties, with a good looking design and and easy to mobile it. Our system is a water industry project that measure the quality of the water with a wifi connection to transfer the data to your phone and control the valve automatically. Unlike other competitors that they do not have this feature.

Constraints:

- Temperature must be less than 80 degrees.
- The input voltage should range between 90 volts and 230 volts.
- Our system should be installed within a maximum distance of 30 meters from the Wi-Fi source.

Target specifications:

- Reducing cost
- Time efficient
- Low number of steps to setting up
- More accuracy
- Better connectivity

Objective

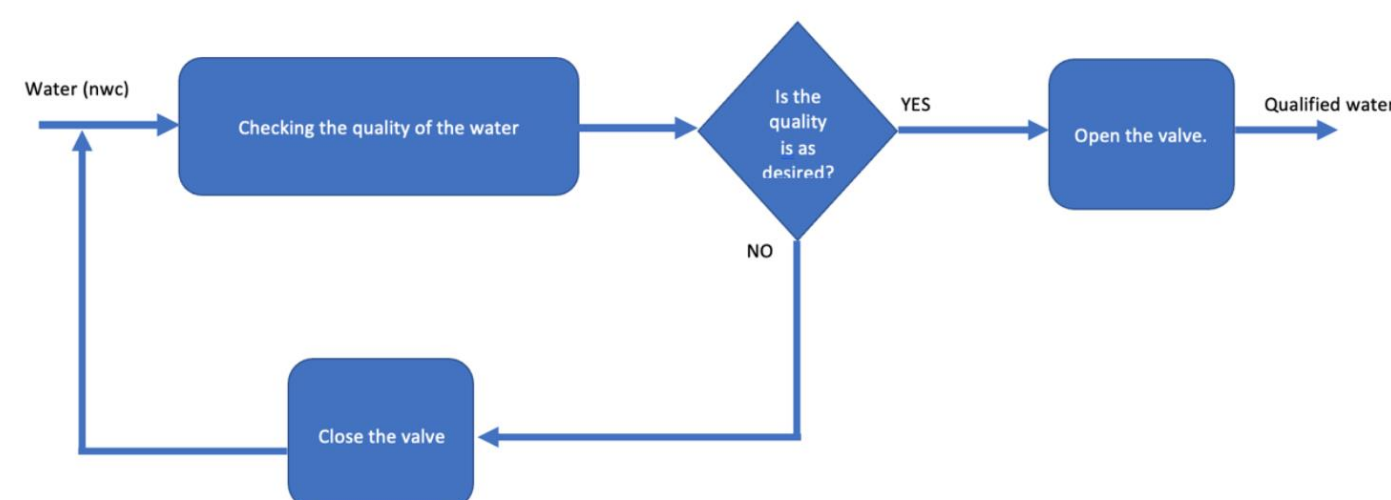
- To monitor the quality of the water.
- To control the valve automatically
- To maintain the quality of the water stable automatically

Mechanism

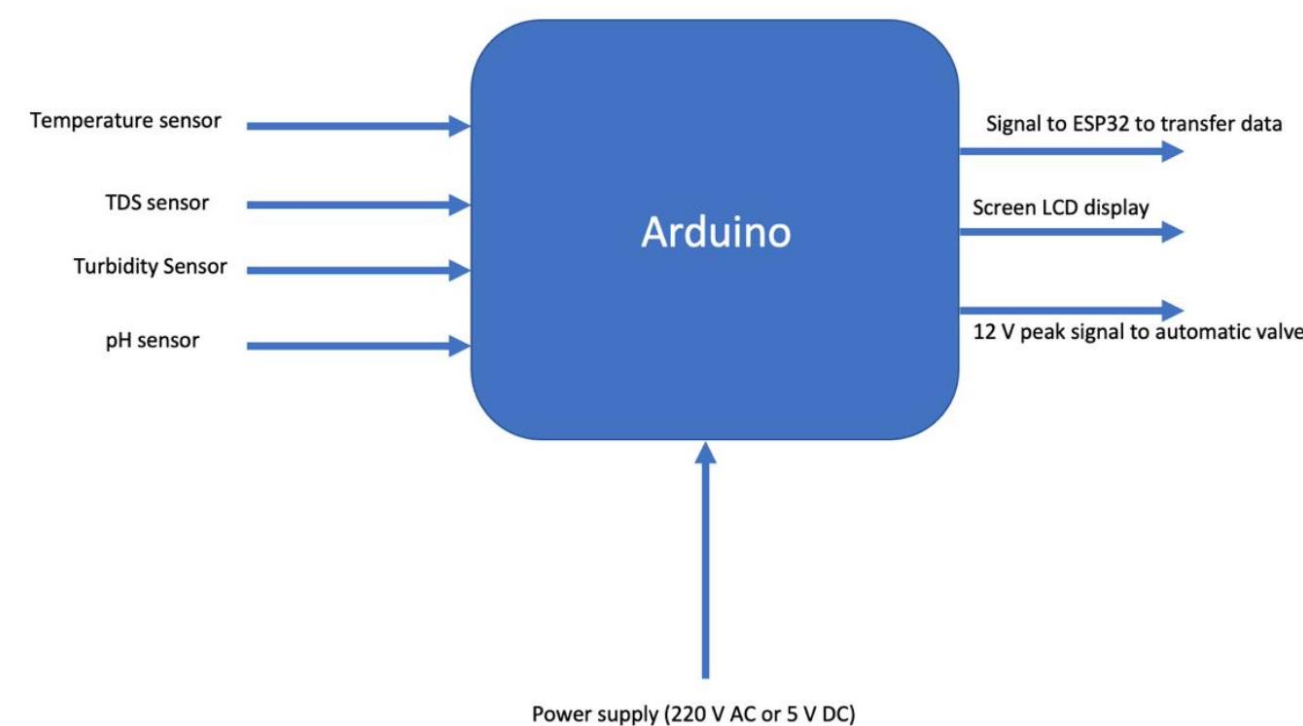
Our system's mechanism is to read the quality parameters of the water in the home tank which are:

- pH
- TDS
- Electric conductivity
- Salinity
- Turbidity

Then due to the results it will take the decision whether open or close the valve.



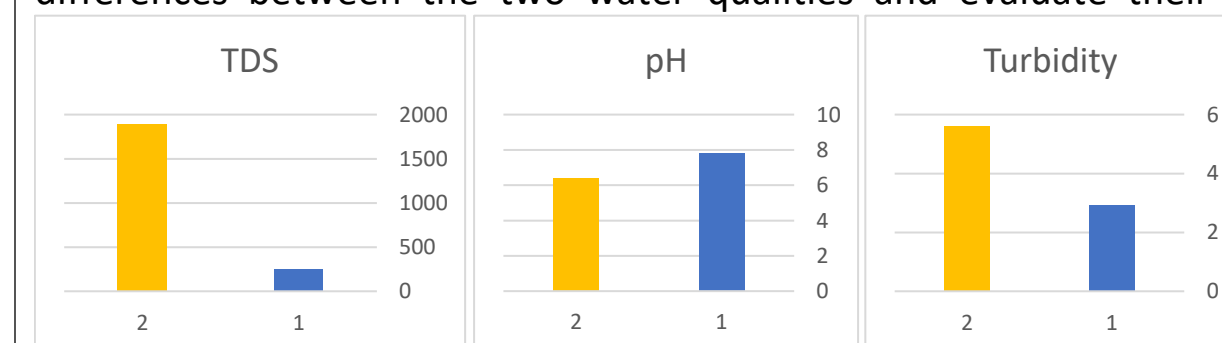
As can be seen from the figure, it shows how our system works.



This figure show how our system works electrically. It gets an input from power supply and a signals that have the readings of the sensors and based on this readings it will send three signals to esp32 for transferring the data through WIFI, a signal to LCD display to show the results in the screen and a signal to automatic valve to open or close the valve based on the condition of the water.

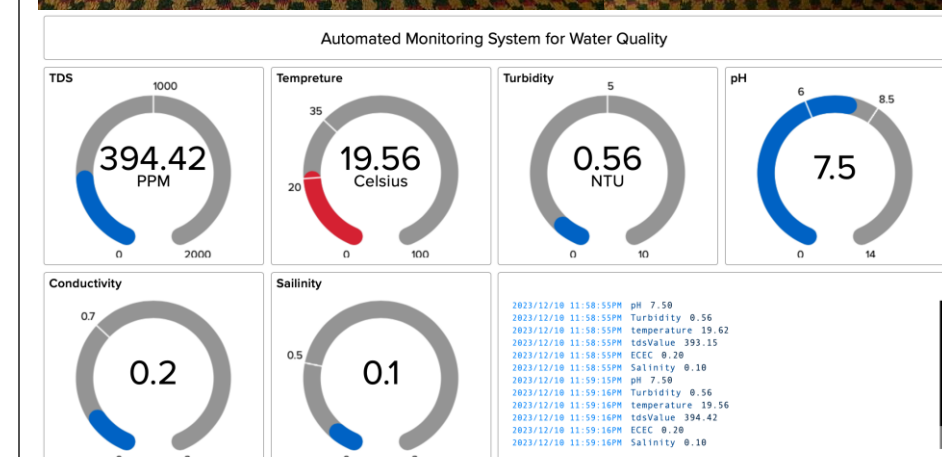
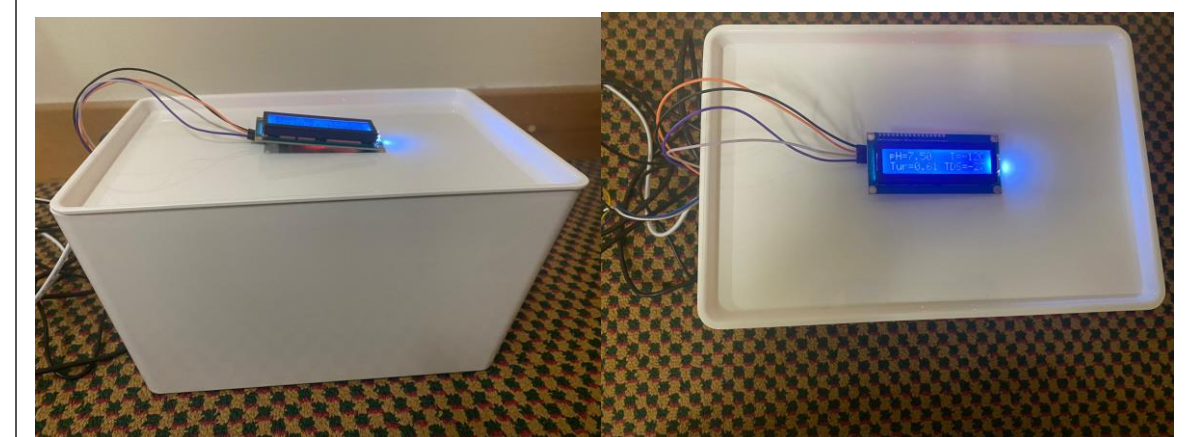
Testing and Validation

For testing and validation, values are measured multiple times in both clean water and poor-quality water. The temperature is kept constant between 22 and 23 degrees Celsius, and measurements for other variables are recorded. Subsequently, the average of these measurements is calculated to observe differences between the two water qualities and evaluate their significance.



Prototype

For the prototype, we will obtain the immediate reading directly from the LCD, as shown below. The ESP32 will be utilized to trigger the values from LCD and send notifications for any values that fall outside the specified range.



Specifications Meets

We designed our system with a focus on time efficiency, as evident in the prototype. The data is updated every 20 seconds, and the system provides notifications if the quality falls outside the specified range. Additionally, we optimized costs by measuring six valves using only four sensors instead of purchasing six sensors, effectively reducing the project's expenses by half. The prototype also demonstrates that our system has a streamlined setup process with a minimal number of steps.

Conclusion

We used all our knowledge that we obtain in KFUPM to perform this project. By integrating the sensors, data processing and real time data we created a system that solves a huge problem which is monitoring and controlling the water in the house to maintain the quality of the water as desired. The automatic valve in our system will operate based on the quality which makes it more efficient. This project also shows the importance of water quality management and the importance of keeping the quality as desired as possible. And since the water is the most important thing in our lives, when we improve the quality of the water, the overall quality of our lives improves as well. In our journey of this project, we have faced so many obstacles, but we made it and we could pass these difficult days. Which improved our skills and we have learned a lot of experience which will help us in the future journey.