**CAPSTONE PROJECT OUTLINE - ACCEPTANCE FORM**

**REBAN CLIFF A. FAJARDO, MIT**

PROJECT

ADVISER

**QUEEN**

**ANGELICA**

**M. GADO**

PANEL

MEMBER

**DR. IAN VAL DELOS REYES**

PANEL

CHAIRMAN

**JERSON**

**M.**

**VIAGEDOR, LPT**

PANEL

MEMBER

This letter confirms that the Objectives, Scope and Limitations, Functional and Non-functional requirements, and the hundred percent (100%) User Interface with thirty percent (30%) Functionality of the project entitled **WQMSys:Smart Water Quality Monitoring System with IoT for Santo Tomas Davao del Norte Water District** by Alexandra May T. Pis-ing, Kent Jun K. Gil, Macky Mar B. Layao, Mhel Jhon D. Leones has been accepted and approved by the respective technical panel committee members based on the previous Outline defense.

The following specific objectives, scope and limitations, and functional and non-functional requirements are as follows:

**Objectives:**

1. To create web-based data visualization to enhance data collection and analysis.
   1. pH Level
   2. Turbidity
   3. TDS (Total Dissolve Solids)
   4. Water Temperature
   5. Data Reports Tab

1.5.1 Month and Year search filter.

1. Implement algorithm and compare three algorithms for forecasting.
   1. Linear Regression Algorithm
   2. Random Forest Algorithm
   3. Time Series Analysis
2. To include forecasting algorithm to predict water quality based on season (months, weeks, day):
   1. Monthly based forecasting.

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2.1.1 Each sensor

* 1. Weekly based forecasting.

2.2.1 Each sensor

* 1. Daily based forecasting.

2.3.1 Each sensor

1. To add indicator to know if the water is potable or not.
2. To add automated alerts and response protocols based on real-time data readings.

# Scope and Limitation

The scope of this study includes the development and deployment of a smart water quality monitoring system utilizing the Internet of Things (IoT) to integrate various sensors. Specifically, the system will employ sensors to measure pH levels, turbidity, Total Dissolved Solids (TDS), water temperature, and water levels. These parameters were chosen to provide a comprehensive overview of water quality. Real-time data collection and analysis will be facilitated through IoT technology, enhancing the interpretation and utility of the data via advanced data visualization tools. The study also involves the implementation of three forecasting algorithms to predict water quality based on seasonal variations, such as months, weeks, and days. Additionally, indicators will be developed to determine the potability of the water, ensuring safe drinking water. An automated alert and response system will be created to notify and guide personnel in the Water District of Santo Tomas, Davao del Norte, based on real-time data readings.

However, there are several limitations to the system. The scope of sensors is limited to only measuring pH levels, turbidity, TDS, water temperature, and water levels. It does not extend to monitoring specific chemical contaminants, heavy metals, or biological agents, which could also affect water quality. The accuracy of the forecasting algorithms is contingent on the quality and extent of historical data available, and predictions may not account for unforeseen environmental changes or events. The system's deployment is tailored specifically to the Water District of Santo Tomas, Davao del Norte, and its efficacy in different locations may vary due to differing environmental conditions and infrastructure. Furthermore, the automated alert and response system is limited to providing notifications and suggested actions, without incorporating automated mechanical interventions or repairs. Real-time data collection is dependent on continuous and stable internet connectivity. Any disruptions could compromise data accuracy and timeliness. Lastly, the overall performance of the monitoring system is reliant on the proper functioning of all sensors, and any sensor malfunction could adversely affect the system's performance.

# Functional Requirements

1. To include user log-in to access the dashboard of the system.
2. To include user-friendly interface dashboard that allows user to navigate easily.
3. To include an accounts page for users to edit personal information on the account.
4. Include the primary function that is to know if water is potable or not.
5. To include pH level, Turbidity, Total Dissolved Solids (TDS), and Water Temperature data visualization based on data collected from the sensor.
6. To include alert notification that triggers when water quality parameters are not within the acceptable range.
7. To include a data history page for enabling users to access past results of the data collected, it also has search filter selecting specific month and year.

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# Non-Functional Requirements

1. **Forecasting in each sensor**. The developers can efficiently write, debug, and manage code related to data collection from sensors, data analysis algorithms, visualization tools, and integration with other systems.
2. **Water Potability.** Through the sensors data collected for more accurate result if the water is potable or not.
3. **Display Water Parameters.** is vital for real-time monitoring and informed decision-making. It enables prompt responses to changes, enhances understanding, and supports compliance efforts on water potability.
4. **Technical Tools.** VSCODE, Laragon, Arduino IDE, Python for machine learning, and C++ for the sensor integration.

Noted by:

**REBAN CLIFF A. FAJARDO, MIT**

Adviser

Date Signed:

Conformed by:

**DR. IAN VAL DELOS REYES**

Panel Chairman

Date Signed:

# QUEEN ANGELICA M. GADO JERSON M. VIAGEDOR, LPT

Panel Member Panel Member

Date Signed: Date Signed:

Received by:

**REBAN CLIFF A. FAJARDO**

Instructor

Date Received: