Annexure -1

SRS for Minor Project-II

Title Of Project: Water Quality Prediction Using Artificial Intelligence Algorithms
Name of the Supervisor: Dr. Bidush Kumar Sahoo

Roll No	**Regd No**	**Name of the Student**
22CSE489	22UG010618	DIKSHYA NAIK
22CSE607	22UG010735	CH. NAVINA PRUSTY
22CSE992	22UG011113	SNEHA BIJU

1. Introduction

1.1 Purpose

The project aims to develop a predictive system for water quality assessment. It will compute the Water Quality Index (WQI) and classify water quality based on critical parameters such as pH, turbidity, biochemical oxygen demand (BOD), and dissolved oxygen (DO). This system supports decision-making for water resource management and environmental monitoring.

1.2 Scope

This system will offer tools for real-time data collection, water quality prediction, and classification into categories like Excellent, Good, Moderate, Poor, and Very Poor. It will provide reports to help environmental scientists, government agencies, and the public make informed decisions.

1.3 Definitions, Acronyms, and Abbreviations

- WQI (Water Quality Index): A numerical representation of water quality.
- WQC (Water Quality Classification): A classification system defining water quality into categories.
- BOD (Biochemical Oxygen Demand): The amount of oxygen required to break down organic material in water.
- DO (Dissolved Oxygen): The level of free oxygen available in water.
- LSTM (Long Short-Term Memory): A neural network model used for sequence prediction tasks.
- NARNET (Nonlinear Autoregressive Neural Network): A recurrent neural network specifically designed to model nonlinear autoregressive processes.

1.4 Overview

The system leverages machine learning to monitor, predict, and classify water quality. By providing actionable insights, it empowers environmental researchers

and policymakers to analyze trends and mitigate risks associated with poor water quality.

2. Overall Description

2.1 Product Perspective

The system acts as an intelligent environmental monitoring tool. It integrates machine learning models and features to create a seamless and interactive platform for water quality analysis.

2.2 Product Functions

The product will allow users to input water quality parameters, predict WQI using machine learning models, classify water quality, and visualize trends.

2.3 User Classes and Characteristics

- Government Agencies: Utilize the platform for regulatory purposes and compliance monitoring.
- Researchers: Access clean and structured data for research and publications.
- General Public: Gain insights into water quality in their area for personal and community health decisions.

2.4 Operating Environment

The system will function as a web-based application accessible through modern web browsers. It will rely on a backend infrastructure to process data and machine learning predictions. Data will be manually input by users through an intuitive interface. The system will ensure compatibility with desktop and mobile devices, requiring only a stable internet connection to function efficiently.

2.5 Design and Implementation Constraints

The system must process large datasets quickly and accurately while adhering to environmental regulations. It should ensure scalability to handle increased data volume and user demands over time.

2.6 User Interface

The user interface will feature a clean and intuitive dashboard displaying data input options, prediction results and classification summaries. It will include user-friendly visualizations for better understanding.

2.7 Assumptions and Dependencies

The system assumes that accurate data will be provided as input for predictions. It depends on users to manually input relevant water quality parameters for analysis.

3. Functional Requirements

3.1 Introduction

This defines the core functions of the system that enable users to collect data, perform predictions, and classify water quality efficiently.

3.2 Functional Requirements

- The system shall allow users to input water quality parameters manually.
- It shall predict the WQI using advanced machine learning models like LSTM and NARNET.
- The system shall classify water quality into categories such as Excellent, Good, Poor, etc., based on WQI.

3.3 External Interfaces

- Data Input: Manual data input by users for water quality parameters.

4. Interface Requirements

4.1 User Interfaces

The user interface will include options for data input, visualization, and report generation. It will be designed to be accessible to both technical and non-technical users, ensuring ease of use.

4.2 Hardware Interfaces

The system will operate on standard hardware devices like personal computers, laptops, and smartphones. It will not require additional specialized hardware.

4.3 Software Interfaces

The system will integrate with AIML models for prediction and use a web-based application to help the users access the system.

4.4 Communication Interfaces

The system will rely on internet connectivity to allow users to access the platform.

Supervisor **Project Coordinator**