**Project Design Phase-II**

**Solution Requirements (Functional & Non-functional)**

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| **Date** | **14 October 2022** |
| **Team ID** | **PNT2022TMID48076** |
| **Project Name** | REAL TIME RIVER WATER QUALITY MONITORING AND CONTROLING SYSTEM |
| **Maximum Marks** | **4 Marks** |

**Functional Requirements:**

**Following are the functional requirements of the proposed solution.**

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| **FR No.** | **Functional Requirement (Epic)** | **Sub Requirement (Story / Sub-Task)** |
| **FR-1** | ***Hardware used*** | * ***Control surface*** * **LCD display** * **Wi-Fi module** |
| **FR-2** | ***Sensors for monitoring*** | * ***PH sensor*** * **Turbidity sensor** * **Temperature sensor** * **remote Data Aggregator Server** |
| **FR-3** | **Software used** | * **IOT Platform** * ***Neural network models in Big Data Analytics and water quality management*** |
| **FR-4** | **IOT applications** | * **Apache HBase managed by Apache ZooKeeper** * **Hadoop distributed file system (HDFS)** |
| **FR-5** | **Real-time analytics technologies** | * **Spark streaming analysis through Spark MLlib** * **Deep learning neural network models** * **Belief Rule Based (BRB) system** |
| **FR-6** | **Neural network models** | * **input layer neurons models** * **hidden/middle layer neurons models** * **output layer neurons models** |

**Non-functional Requirements:**

**Following are the non-functional requirements of the proposed solution.**

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| **FR No.** | **Non-Functional Requirement** | **Description** |
| **NFR-1** | **Usability** | * **Monitoring provides the objective evidence necessary to make sound decisions on managing water quality today and in the future.** |
| **NFR-2** | **Security** | * **Applications can create znode in zookeeper. Apache HBase is managed by Apache ZooKeeper.** * **The IoT application will help the users to visualize the water quality analysis results produced by the data management layer over different time series continuously.** * **This application runs on client devices such as Smart phones, laptops and desktops.** * **The root users will be able to generate daily/monthly/yearly water quality report from data management layer and visualize in the client devices.** |
| **NFR-3** | **Reliability** | * **Hadoop cluster is fault tolerant as jobs are redirected automatically to the running nodes when nodes are failed.** * **The data in Hadoop is highly available as multiple copies of data are stored in data nodes managed by name node, standby name node, journal nodes and fail over controller.** |
| **NFR-4** | **Performance** | * **To measure water parameters such as pH, dissolved oxygen, turbidity, conductivity, etc. us0ing available sensors at a remote place.** * **To assemble data from various sensor nodes and send it to the base station by the wireless channel.** * **To simulate and evaluate quality parameters for quality control.** * **To send SMS to an authorized person routinely when water quality detected does not match the preset standards, so that, necessary actions can be taken.** |
| **NFR-5** | **Availability** | * **Using different sensors, this system can collect various parameters from water, such as pH, dissolved oxygen, turbidity, conductivity, temperature, and so on.** * **The rapid development of WSN technology provides a novel approach to real-time data acquisition, transmission, and processing.** * **The clients can get ongoing water quality information from far away.** |
| **NFR-6** | **Scalability** | * **To develop a system for continuous monitoring of river water quality at remote places using wireless sensor networks with low power consumption, low-cost and high detection accuracy.** * **PH, conductivity, turbidity level, etc. are the limits that are analyzed to improve the water quality.** |