Project Design Phase-I
Proposed Solution Template

Date	20 October 2022
Team ID	PNT2022TMID03606
Project Name	**Project –** REAL-TIME RIVER WATER QUALITY MONITORING AND CONTROL SYSTEMS

Proposed Solution Template:

Project team shall fill the following information in proposed solution template.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	To continuously monitor the river water quality by checking the parameters like dust, turbidity, pH etc. if at all any reduction in water quality is sensed, the product implemented should push SOS alert messages to the end user. This is the basic problem statement.
2.	Idea / Solution description	Much like arteries and veins in a body, streams and rivers pump invaluable lifeblood — that is, fresh water — throughout a landscape. In the U.S., management of these vessels, and, indeed, all water bodies, focuses on maintaining and expanding existing supplies of freshwater to keep up with growing demand. This demand is fueled by various uses, categorized broadly by the U.S. Geological Survey as commercial, domestic, industrial, irrigation, livestock, mining, public supply and thermoelectric power. While not all of these uses may draw directly from a stream or river, the water required for each will have almost certainly passed through a flowing waterway at some point. Monitoring systems may be established in streams and rivers for reasons as varied as the water uses listed above, but your application will likely fall into one of two broad categories: research or practical. Research applications include systems designed to study one or more aspects of stream and river hydrology or water quality, whether to educate or provide a better understanding of human impact, animal use, habitat quality, etc. Practical applications include systems designed to monitor impact from your own project, or perhaps the project of a client. This could entail monitoring turbidity during a dredging project, discharge and flow rates at a fish hatchery, or nutrient loads near an agricultural operation, among others. So we have decided to implement a system using IBM Watson IoT Platform, Node-Red and IBM Cloud. The various sensors like the temperature sensor, pH meter is used to test for dirt, acidity or alkalinity, total dissolved solids and turbidity to ensure levels are safe for human use. After the check is complete the data is sensed and sent to the IBM Cloudant server from which data can be displayed to the end user through the Web UI or web application.

		The User gets SoS Alerts through a fast SMS service which is pushed when the water quality levels fall below the estimated quality level and periodic data on the water quality is also being stored in cloud and can also be monitored by the user.
		We are going to be using multiple sensors, such as temperature sensor which are all interfaced with a microcontroller to continuously monitor the temperature of the river water. This is an essential step, as the sea creature's may die out due to extensive water temperature. We are going to be connecting it to the raspberry pi microcontroller, with the aid of GPIO pins. The other sensors include the turbidity sensor, which checks for dirt and dust in the water , and therefore if the sensed value is lower than the threshold, them the microcontroller will use the sensed, after which the further process of sending SMS to the user is made. Ph level can also be monitored with the help of sensors available in the market and be placed in line with the microcontroller's GPIO pin. The code is written for all the three sensor, which are all together connected with the microcontroller.
3.	Novelty / Uniqueness	The objective of our project is to continuously monitor the river water quality, by looking after parameters such as Temperature ,pH, dust in the water body by using many sensors. and after detection of any unwanted qualities in water, the direct SoS SMS is pushed to the Authorities in charge. The water quality from the rivers has a considerable importance for the reason that these water resources are generally used for multiple matters such as: drinking domestic and residential water supplies, agriculture (irrigation), hydroelectric, power plants, transportation and infrastructure, tourism, recreation, and other human or economic ways to use water. As a subject of uniqueness, we have planned to implement a separate system, Apart from the parameters such as temperature, pH, dust monitoring. It is the idea which will specify if there is a need of inplanting water treatment or not. If river water quality is worst, then SMS will denote the alum water treatment measure is required. We are using the turbidity sensor to check the turbidity in water. **Alum water treatment** idea to then adopted to cleanse water and the process uses **Aluminum Sulfate chemical**. Alum (aluminum sulfate) is a nontoxic liquid that is commonly used in water treatment plants to clarify drinking water and used to lower the amount of phosphorus in water. Using this method of treatment helps use to remove unwanted chemical particles from water by forming precipitate and this floc is settled down within the water.
4.	Social Impact / Customer Satisfaction	**Clean Water for Future Generations** Nearly 60% of water projects in India fail, often within the first year. This is caused by a variety of circumstances, but these two stand out as the leading factors: 1. Lack of technical expertise and continued oversight 2. Lack of community involvement

		Success of any project is not easy to come by, It requires innovation, expertise, adaptability, conscientiousness, and a commitment to the long-term success of our partner communities. 100% success is only achievable due to our robust sustainability model.

Industrial production has grown in India by more than 50-fold over the past century. The Central Pollution Board (CPCB) has identified 17 categories of most polluting industries which contribute to the environment in terms of suspended particulate matter, gases and effluents. About 77 per cent of the industries contribute to water pollution while 15 per cent to air pollution and the remaining eight per cent to both air and water pollution. The industries which are dependent on natural resources like water are the most polluting ones and are growing rapidly. Heavy metal pollution from industries is affecting human health in a significant way. The heavy metals are among the most common pollutants found in wastewater, which often decreases the pH level, thereby making the water more acidic.

CONCLUSION
It is proven that 77 per of river water pollution is due to improper management by many industries reliant on water source. Main reason of this being waste disposal recklessly into ocean water and lacking in continuous monitoring of water quality. if our project is practically deployed and continuous evaluation of water quality is done, Industries can be able to take some preventive measures when the quality of river water lacks behind the threshold. |
| 5. | Business Model (Revenue Model) | Please find the BMC link:

https://docs.google.com/presentation/d/1rHGUE-6uDHfeMdOjqdKbOE-eeK-1R56V/edit?usp=sharing&ouid=10409595824505840218&rtpof=true&sd=true |
| 6. | Scalability of the Solution | **CUSTOMER PARTNERSHIP:**
        Central Water Commission is monitoring the water quality of rivers since late 1950s and presently its water quality network is spread all over India and they would be the key partner of our business model.
        Central Ground Water Board (CGWB) Ministry of Jal Shakti, Department of Water resources, River Development and Ganga Rejuvenation, Government of India and it is another government organization that they can become a partner of our business model.
SALES PROCESS:
        There are many products with separate features are already available in the market, Our model can a make a place in this competitive market by integrating all features in it.
MARKETING FOCUS:
  • The Main customer of our product would be the Government Organizations , Ship manufacturers and sailors ,fishermen, local authorities. And this model is also used for industrial development companies like Soda & soft drink companies. In India a Soft drink need 1.9 liters of clean drinking water to make a 1-Liter soft drink. |

| | | • This model focuses on the shares of companies investing in water quality monitoring system and this model also focuses on automation in making good quality water.

REPEATABILITY OF SOLUTION:
• This model also uses the olden technique for maintaining pH of the water by measuring pH and mixing the required solution for making the Ph neutral.
• This proposed model also has sensors like temperature, turbidity sensor, pH sensor, which is already used for various applications for its accuracy.

The project can very well be taken forward to **international markets** as the problem of poor water quality management is seen worldwide. So, The demand of the product is evergreen and is much needed by every country. |
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Document Links:

NOVELTY:

https://docs.google.com/document/d/1UfJg6OJrbN6YHkl5lHnNFi34XnF98SeM/edit?usp=sharing&ouid=10409595824505840218&rtpof=true&sd=true

SOCIAL IMPACT:

https://docs.google.com/document/d/1rDpwx9H0VBNjCxYVBbjz5zH_Ecb_fCAI/edit?usp=sharing&ouid=10409595824505840218&rtpof=true&sd=true

SCALABLITY:

https://docs.google.com/document/d/1TrgbOovWpKJarFBdaW9CuOFxRIASfjOq/edit?usp=sharing&ouid=10409595824505840218&rtpof=true&sd=true

BUSINESS MODEL CANVAS:

https://docs.google.com/presentation/d/1rHGUE-6uDHfeMdOjqdKbOE-eeK-1R56V/edit?usp=sharing&ouid=10409595824505840218&rtpof=true&sd=true