Project Report

Date	18 November 2022
Team ID	PNT2022TMID49552
Project Name	Real Time River Water Quality Monitoring and Control system.

1. INTRODUCTION

***Project Overview :**

The system consists of several sensors which are used for measuring physical and chemical parameters of water. The parameters such as temperature, Ph, and dissolved oxygen of the water can be measured. Using this system a person can detect pollutants from a river water.

***Purpose:**

The main aim is to develop a system for continuous monitoring 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. The limits that are analysed to improve the water quality.

1. LITERATURE SURVEY

- **INTRODUCTION:**

The environment around consists of five key elements e.g., soil, water, climate, natural vegetation, and landforms. Among these water is the utmost crucial element for human life. It is also vital for the persistence of other living habitats [1]. Whether it is used for drinking, domestic use, and food production or recreational purposes, safe and readily available water is the need for public health [2]. So it is highly imperative for us to maintain water quality balance. Otherwise, it would severely damage the health of the humans and at the same time affect the ecological balance among other species [3]. Water pollution is a foremost global problem which needs ongoing

evaluation and adaptation of water resource directorial principle at the levels of international down to individual wells. It has been studied that water pollution is the leading cause of mortalities and diseases worldwide. The records show that more than 14,000 people die daily worldwide due to water pollution. In many developing countries, dirty or contaminated water is being used for drinking without any proper prior treatment. One of the reasons for this happening is the ignorance of public and administration and the lack of water quality monitoring system which makes serious health issue.

- **Proposed system**

The main aim is 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. Following are the aims of idea implementation (a) To measure water parameters such as pH, dissolved oxygen, turbidity, conductivity, etc. using available sensors at a remote place. (b) To assemble data from various sensor nodes and send it to the base station by the wireless channel. (c) To simulate and evaluate quality parameters for quality control. (d) 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.

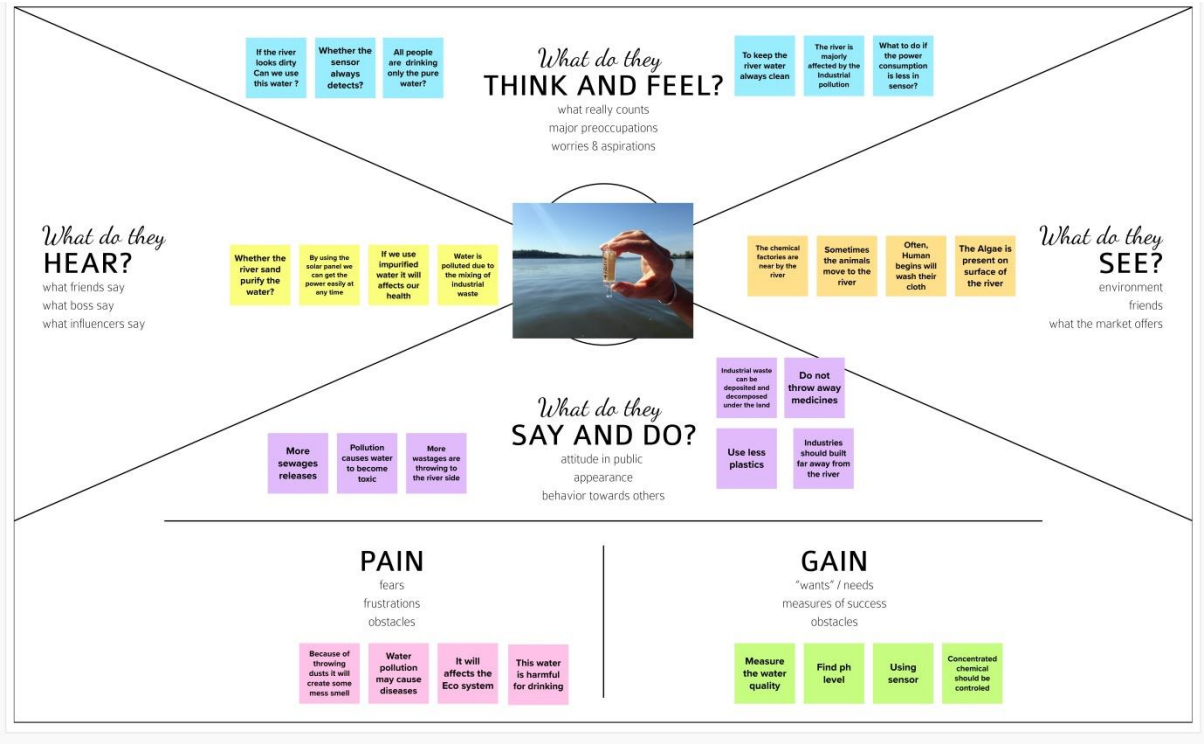
- ***pH sensor***

The pH of thing is a useful constant to display because graduate and low pH levels can hump large effects on the author. The pH of a statement can grasp from 1 to 14. A pH sensor is an instrumentation that measures the hydrogen-ion density in a bleach, indicating its tartness or alkalinity. Its constitute varies from 0 to 14 pH

3. IDEATION AND PROPOSSED SOLLUTION

*** Empathy Map Canvas:**

- **It is used to tell about the project of pain, gain, feel and think.**



***IDEATION & BRAINSTORMING**

*** Each and every member that is 6 members in a team shared our idea about this project. From this idea we have chosen one idea for the next level of this project.**

2

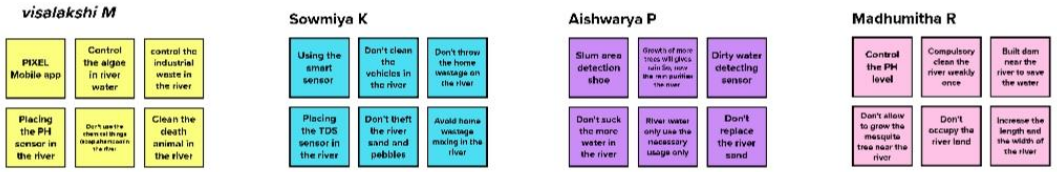
Brainstorm

Write down any ideas that come to mind that address your problem statement.

10 minutes

TIP

You can select a sticky note and hit the pencil [switch to sketch] icon to start drawing!



3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. In the last 10 minutes, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.

20 minutes

Category 1

Placing the PH sensor in the river

Using the smart sensor

Category 2

Don't throw the home wastage on the river

Control the industrial waste in the river

Category 3

Don't theft the river sand and pebbles

Don't replace the river sand

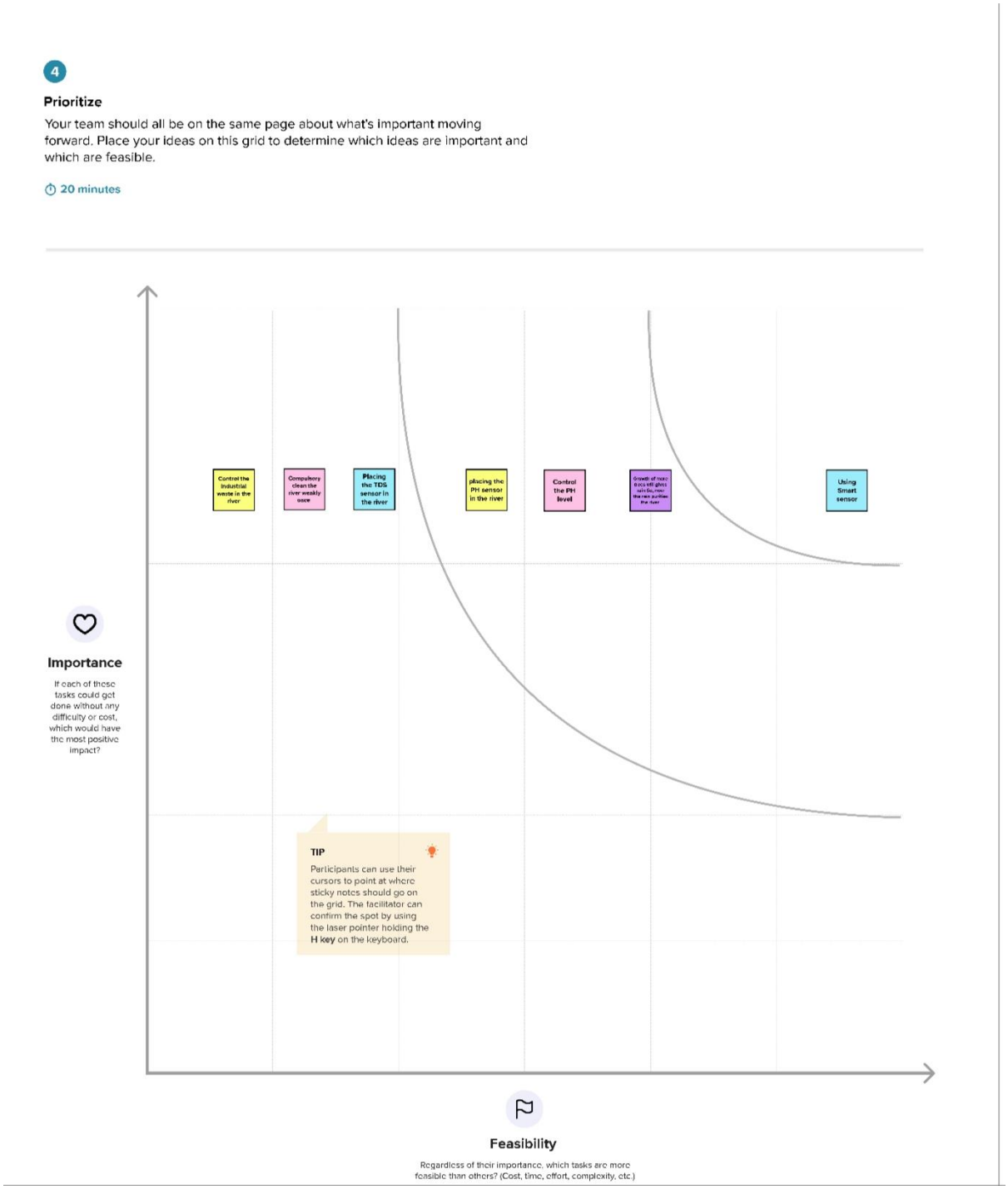
Category 4

Growth of more trees will gives rain so, now the rain pattern the river

Don't allow to grow the mesquite tree near the river

TIP

Add customizable tags to sticky notes to make it easier to find, browse, organize, and categorize important ideas as themes within your mural.



***PROPOSED SOLUTION**

***we have given the solution for the project impact in more ways. And also we have said about the marketing of this solution**

Project Design Phase-I
Proposed Solution Template

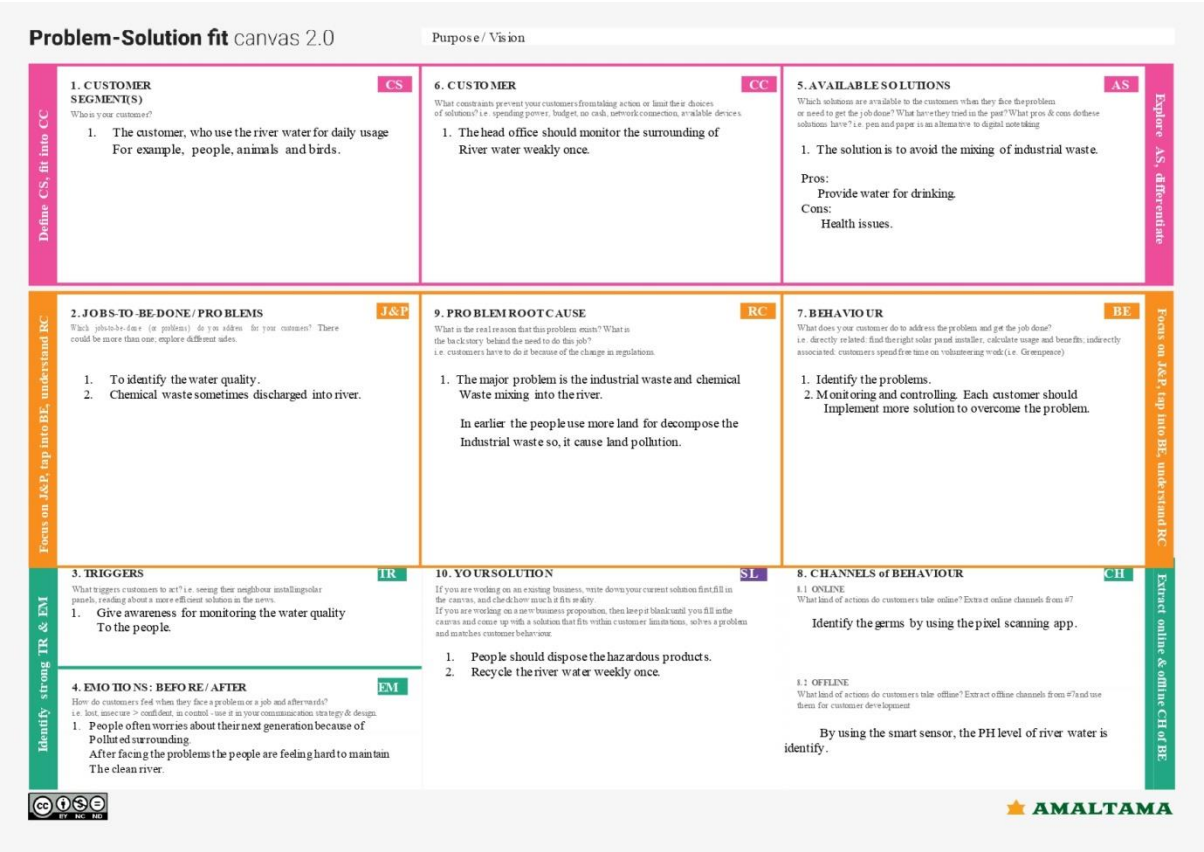
Date	24 September 2022
Team ID	PNT2022TMID49552
Project Name	Real Time river water quality Monitoring and Control System
Maximum Marks	2 Marks

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)	Most of the water is affected by the industrial wastes and by washing vehicles the engine oil is mix with the river water
2.	Idea / Solution description	Dispose the toxic chemicals and medical waste properly. By finding the pH level we can check the water quality(using smart sensor).
3.	Novelty / Uniqueness	Instead of using battery we are going to use the solar light for the setup as well as detector and wireless sensor are also used.
4.	Social Impact / Customer Satisfaction	*Everyday peoples and animals will drink only the pure water. *Good environment surrounding the river. *The good quality river water is mainly used for farmers.
5.	Business Model (Revenue Model)	After finding the pH value, recycle the water for selling
6.	Scalability of the Solution	The device can use in all kind of river. Major efficiency of device: Easily identify the device because it has a detector

*POROBLEM SOLLUTION FIT



4. REQUIREMENT ANALYSIS

*FUCTIONAL & NON FUNCTIONAL REQUIREMENT

It is used to tell the function needed for this project and its use.

Project Design Phase-II
Solution Requirements (Functional & Non-functional)

Date	15 October 2022
Team ID	PNT2022TMID49522
Project Name	REAL TIME RIVER WATER QUALITY MONITORING AND CONTROL SYSTEM
Maximum Marks	4 Marks

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	DETECTOR	We are using different types of detectors. It is used to Identify the device location and to detect the water level.
FR-2	SOLAR PANEL	The solar panel is used to the power requirement.
FR-3	SENSOR(PH,TDS)	Identify the PH level of the water.
FR-4	RASPERRY Pi	All the components are placed in the Rasperry pi

Non-functional Requirements:

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

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	By using the device, we can identify the water quality easily.
NFR-2	**Security**	Protect sensitive data stored on devices. Prevent Unauthorized uses from mobile devices to access
NFR-3	**Reliability**	The device will perform satisfactorily for a specified period of time.
NFR-4	**Performance**	It is a continuous process in which the data and PH values can be analysed easily.
NFR-5	**Availability**	By using the sensor we can identify the ph level of river water.
NFR-6	**Scalability**	The measure of a system ability to increase or decrease in performance.

5. PROJECT DESIGN

- **Data flow Diagrams**

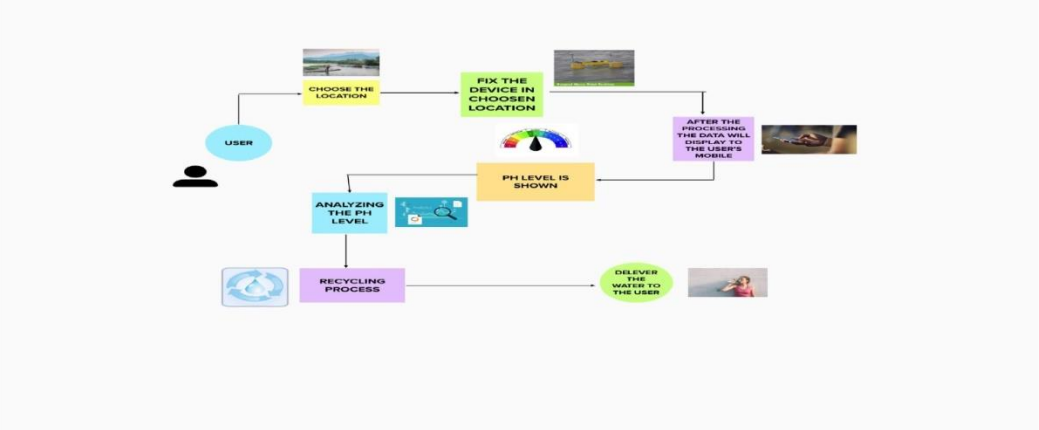
- **Ideas are given by the user for the drinkable purity water.**

DATA FLOW DIAGRAMS & USER STORIES

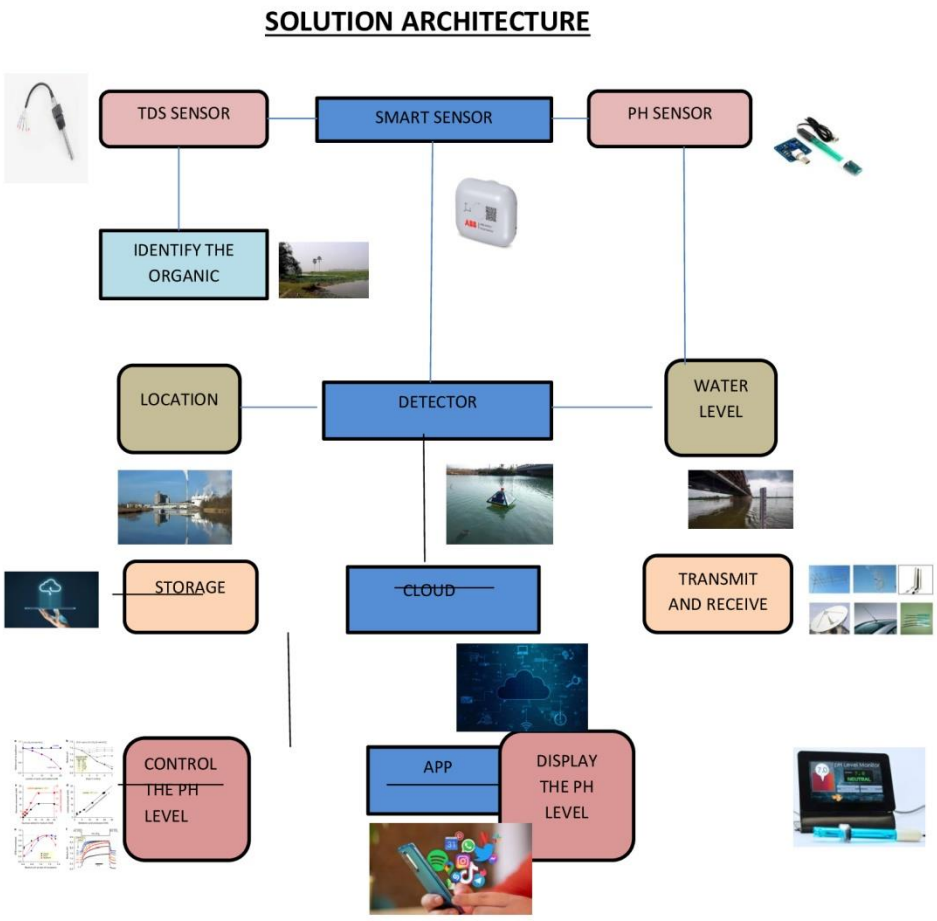
Project Design Phase-II

Date	15 October 2022
Team ID	PNT2022TMID49552
Project Name	Real Time River water Quality Monitoring and Control System.
Maximum Marks	4 Marks

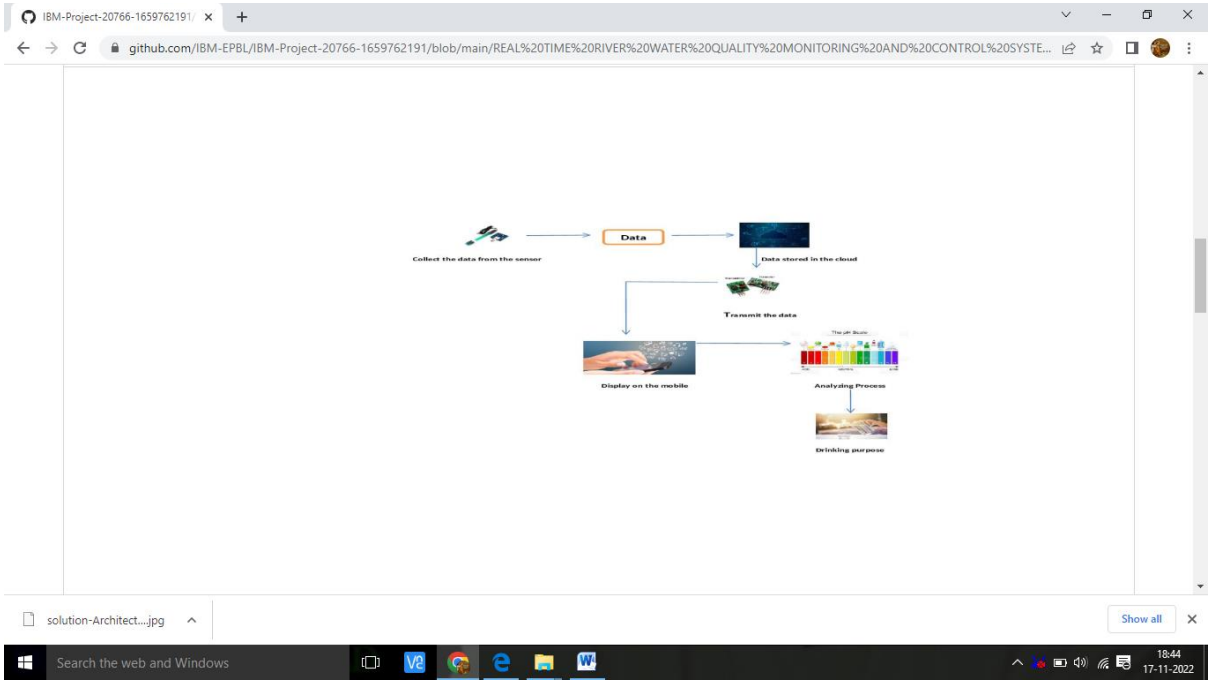
Data Flow Diagram:



- **SOLUTION &TECHNICAL ARCHITECTURE**



TECHNOLOGY ARCHITECTURE



- **USER STORIES**

  To provide the ph value and quality of water to the user for their needs.

User Stories

Use the below template to list all the user stories for the product.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (River side People)	They wish only to drink the pure river water.	USN-1	To maintain the river water to be always clean.	The pH value of the river water is always known.	High	Sprint-1
Customer(Farmers)	The good pH level of water is needed for Farmers.	USN-2	The Farmer who raises crops for preparing land for planting and harvesting.	The Soil moisture in the root is a good criterion for scheduling irrigation.	High	Sprint-1
Customer(Manufacturer)	The Manufacturer always wants the non-chemical river water.	USN-3	12% of water is needed for manufacturing business like paint and coating.	They will analyse the solutions for the problems.	High	Sprint-1
Customer(Government agencies)	The agent wants to be the river water always clean.	USN-4	Government form NSS camp in each schools and colleges for monthly once to clean the river water.	By comparing previous condition of water, there are more changes in the river water.	Medium	Sprint-2
Customer(Environmentalist)	To know the water pollution	USN-5	The Environmentalist can collect various data from the device.	The sensor can collect the real time data.	High	Sprint-1

6. PROJECT PLANNING AND SCHEDULING

SPRINT PLANNING & ESTIMATION

For analysing step by step process.

Project Planning Phase

Project Planning Template (Product Backlog, Sprint Planning, Stories, Story points)

Date	22 October 2022
Team ID	PNT2022TMID49552
Project Name	Real Time River Water Quality Monitoring and Control system.
Maximum Marks	8 Marks

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

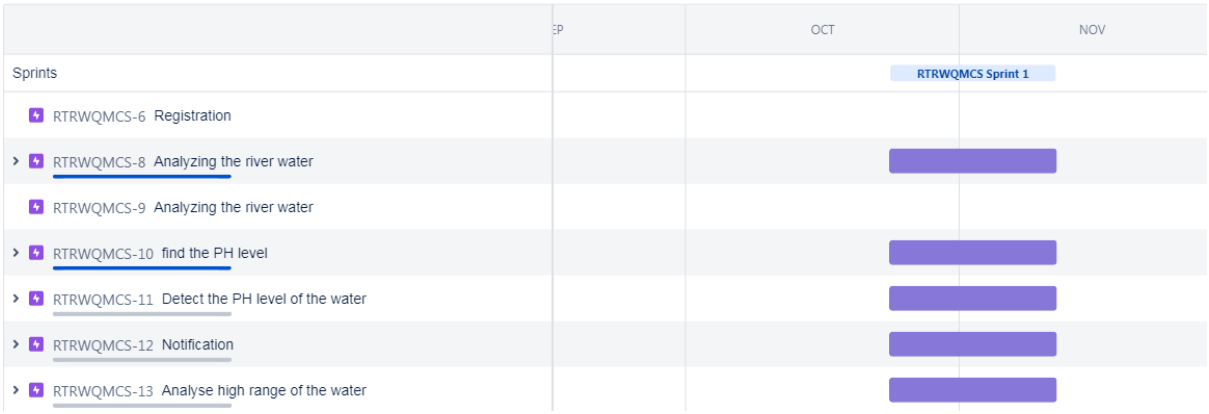
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Analysing the river water.	USN-1	The researcher take the necessary action to maintain the river water always clean	2	High	Visalakshi M Sowmiya K
Sprint-1	Find the PH level.	USN-2	People wants to drink only the pure water because they worried about their health.	2	High	Aishwarya P Madhumitha. R
Sprint-2	Detect the pH level of water.	USN-3	The Farmers who raise crops for preparing land for planting and harvesting.	2	Medium	Sowmiya K Aishwarya P
Sprint-3	Notification	USN-4	Can use the transmitter the message will send the users mobile.	2	High	Visalakshi M Madhumitha R
Sprint-4	Analyse High range of PH level.	USN-5	Which PH value range is high is should be control.	2	Medium	Visalakshi M Aishwarya P

Project Tracker, Velocity & Burndown Chart: (4 Marks)

- **SPRINT DELIVERY TIME**

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

- Report from JIRA



7. CODING & SOLUTION

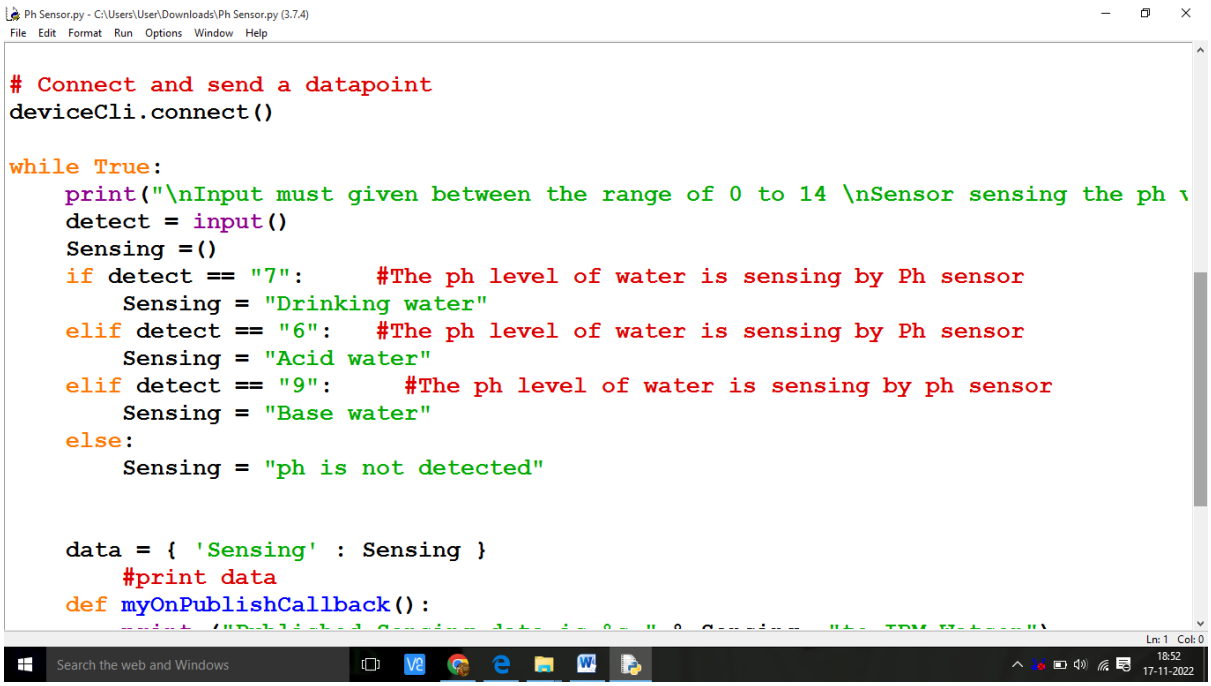
Coding explanation:

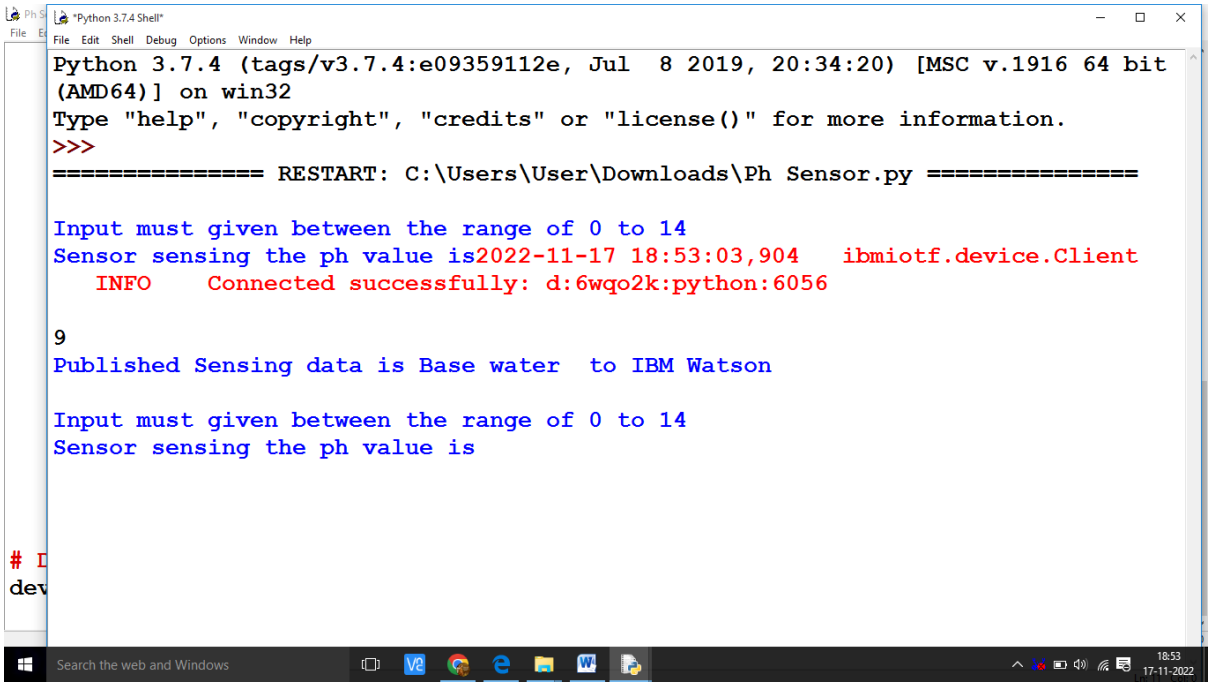
This coding is based on identifying the ph level of water. Coding will run in the python software. After running the program, we should give the ph value based on: acid,base,drinkable water. This output will shown in the IBM Watson and in Node-Red.

Solution:

Through the WEB UI we can see the quality and nature of drinkable water.

S


Ph Sensor.py - C:\Users\User\Downloads\Ph Sensor.py (3.7.4)
File Edit Format Run Options Window Help
# Connect and send a datapoint
deviceCli.connect()
while True:
print("\nInput must given between the range of 0 to 14 \nSensor sensing the ph v
detect = input()
Sensing =()
if detect == "7": #The ph level of water is sensing by Ph sensor
Sensing = "Drinking water"
elif detect == "6": #The ph level of water is sensing by Ph sensor
Sensing = "Acid water"
elif detect == "9": #The ph level of water is sensing by ph sensor
Sensing = "Base water"
else:
Sensing = "ph is not detected"
data = { 'Sensing' : Sensing }
#print data
def myOnPublishCallback():
Ln: 1 Col: 0
Search the web and Windows
18:52
17-11-2022



8. TESTING

*Test cases

	D	E	F	G	H	I	J
1		Date	18-Nov-22				
2		Team ID	PNT2022TMID49552				
3		Project Name	Real time river water quality moni				
4		Maximum Marks	4 marks				
5	**Test Scenario**	**Pre-Requisite**	**Steps To Execute**	**Test Data**	**Expected Result**	**Actual Result**	**Status**
6	Location Test Case	Indicate the near by river	By using GPS	https://shopenzer.com/	Display the current location	Working as expected	Pass
7	Industrial Test Case	Know the record of particular industry.	By using Advertisement	https://shopenzer.com/	Detect the toxic chemical	Working as expected	Fail
8	River Surrounding Test Case	Maintain the good environment	Provide more information about the surrounding of the river.	Username: chalam@gmail.com password: Testing123	Detect the nature of environmnet surrounded by the river.		
9	pH Test Cases	Accurate quality of water	By using pH sensor.	Username: chalam@gmail password: Testing123	Detect the water quality level.		
10	Purity and Dirty Test Cases	Good water as well as bad water	By comparing the pH level for good water and bad water.	Username: chalam@gmail.com password: Testing1236786867868768	Identify which kind of water should be drinked		
11	Agriculture Test Cases	Evergreen process	By using the different kind of strategy	Username: chalam password: Testing1236786867868768	Better growth in agriculture field		
12							

*USER ACCEPTANCE TESTING

2. Defect Analysis

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	12	3	1	2	18
Duplicate	2	0	1	0	3
External	3	2	0	1	6
Fixed	12	3	5	21	41
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	2	3
Won't Fix	0	4	3	1	8
Totals	29	12	12	27	80

3. Test Case Analysis

This report shows the number of test cases that have passed, failed, and untested

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	6	0	0	6
Client Application	53	0	0	53

3. Test Case Analysis

This report shows the number of test cases that have passed, failed, and untested

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	6	0	0	6
Client Application	53	0	0	53
Security	2	0	0	2
Outsource Shipping	4	0	0	4
Exception Reporting	8	0	0	8
Final Report Output	4	0	0	4
Version Control	2	0	0	2

9. RESULT:

Performance Metrics:

Date	18 November 2022
Team ID	PNT2022 TMID49552
Project Name	Real Time River water quality Monitoring and control system
Maximum Marks	10 Marks

		NFT - Risk Assessment						
S. No	Project Name	Scope \ feature	Functional Changes	Hardware Changes	Software Changes	Impact of Downtime	Load/ Volume Changes	Risk Score	Justi-fication
1	Real Time River Water Quality Monitoring and control system	New	Moderate	Moderate	High	low	>5 to 10%	ORANGE	Speed performance: Better Scalability

10.ADVANTAGES & DISADVANTAGES

ADVANTAGES:

- **Help to continuous monitoring of water quality on Real time basis.**
- **Give the accurate output in case the water is not as per required standards.**
- **Helps the treatment plants operators to take immediate corrective actions if the water quality is not as per required standards.**
- **Protecting human health.**

- **Avoid the costs related to medical care, productivity loss, and even loss of life.**

DISADVANTAGES:

- **It is difficult to collect the water samples from all the area of the water body.**
- **The cost of analysis is very high.**
- **The lab testing and analysis takes some time and hence the lab results does not reflect real time water quality measurement due to delay in measurement.**

11. CONCLUSION

*** Water pollution stems from many sources and causes, only a few of which are discussed here.**

*** Rivers and streams demonstrate some capacity to recover from the effects of certain pollutants, but lakes, ponds and ocean have little resistance to the effects of water pollution.**

*** Human demand for freshwater is increasing; in particular, water is required to irrigate crops to feed the rapidly expanding human population.**

12. FUTURE SCOPE

***It is important to monitor water quality to ensure that it is safe for human to drink it as well as for wildlife, and marine life.**

*** Regarding ports, it is important to measure water quality to understand environment impacts.**

13. APPENDIX

Github link:

https://github.com/IBM-EPBL/IBM-Project-20766-1659762191

Project Demo Link

https://drive.google.com/file/d/1P9KCu0sxuebfbsKkLmE7vg79vyb34m-Y/view?usp=share_link