## **PROJECT REPORT**

# REAL-TIME RIVER WATER QUALITY MONITORING AND CONTROL SYSTEM

**TEAM ID: PNT2022TMID23696** 

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## **INDEX**

#### 1.INTRODUCTION

- 1.1 Project Overview
- 1.2 Purpose

#### 2.LITERATURE SURVEY

- 2.1 Existing problem
- 2.2 References
- 2.3 Problem Statement Definition

#### 3.IDEATION & PROPOSED SOLUTION

- 3.1 Empathy Map Canvas
- 3.2 Ideation & Brainstorming
- **3.3 Proposed Solution**
- 3.4 Problem Solution fit

#### **4.REQUIREMENT ANALYSIS**

- **4.1 Functional requirement**
- **4.2 Non-Functional requirements**

#### **5.PROJECT DESIGN**

- **5.1 Data Flow Diagrams**
- **5.2 Solution & Technical Architecture**
- **5.3** User Stories

#### 6.PROJECT PLANNING & SCHEDULING

**6.1 Sprint Planning & Estimation** 

- **6.2 Sprint Delivery Schedule**
- 6.3 Reports from JIRA

#### 7.CODING & SOLUTIONING

- **7.1 Feature 1**
- **7.2 Feature 2**

#### **8.TESTING**

- 8.1 Test Cases
- **8.2** User Acceptance Testing

#### 9.RESULTS

**9.1 Performance Metrics** 

#### 10.ADVANTAGES & DISADVANTAGES

- 11.CONCLUSION
- 12. FUTURE SCOPE
- 13. APPENDIX
  - 13.1 Source Code
  - 13.2 GitHub & Project Demo Link

## **INTRODUCTION**

### 1.1 Project Overview:

**River Water quality monitoring System** 

River water which is used as drinking water is a very precious commodity for all human beings. 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 water body from anywhere in the world. Current water quality monitoring system is a manual system with a monotonous process and is very time-consuming This paper proposes a sensor-based water quality monitoring system. The main components of Wireless Sensor Network (WSN) include a micro-controller for processing the system, communication system for inter and intra node communication and several sensors Real-time data access can be done by using remote monitoring and Internet of Things (IoT) technology Data collected at the IBM cloud Server and verify them to trigger the actions to be performed.

#### 1.2 Purpose:

Water quality refers to chemical, physical biological and radio logical characteristics of water. It is a measure of the condition of water relative to the necessities of one or more bio-tic species and or to any human need or purposes .Water quality monitoring is defined as a sampling and analysis of the water in lake, stream, ocean and river and conditions of the water body. Smart water quality monitoring is a process of real-time monitoring and the analysis of water to identify changes in parameters based on the physical, chemical and biological characteristics. Monitoring water quality is clearly important: in our seas, our rivers, on the surface and in our ports, for both companies and the public. It enables us to assess how they are changing, analyze trends and to inform plans and strategies that improve water quality and ensures that water meets its designated use. There are several indicators determining water quality. These include dissolved oxygen, turbidity, bio indicators, nitrates, pH scale and water temperature. Monitoring water quality helps to identify specific pollutants, a certain chemical, and the source of the pollution. There are many sources of water pollution: wastewater from sewage seeping into the water supply; agricultural practices (e.g., the use of

pesticides and fertilizer); oil pollution, river and marine dumping, port, shipping and industrial activity. Monitoring water quality and a water quality assessment regularly provides a source of data identify immediate issues – and their source.

- Identifying trends, short and long-term, in water quality.
- Data collected over a period of time will show trends, for example identifying increasing concentrations of nitrogen pollution in a river or an inland waterway. The total data will then help to identify key water quality parameters.
- Environmental planning methods: water pollution prevention and management.
- Collecting, interpreting and using data is essential for the development of a sound and
  effective water quality strategy. The absence of real-time data will however hamper
  the development of strategies and limit the impact on pollution control. Using digital
  systems and programs for data collection and management is a solution to this
  challenge.
- Monitoring water quality is a global issue and concern: on land and at sea. Within the European Union, the European Green Deal sets out goals for restoring biological biodiversity and reducing water pollution, as well as publishing various directives to ensure standards of water quality. Individual nation states, for example France, have also clear regulatory frameworks requiring the effective monitoring of water quality. In the United States, the Environmental Protection Agency (EPA) enforces regulations to address water pollution in each state. Across the world, countries increasingly understand the importance of effective water quality monitoring parameters and methods.

### **2.LITERATURE SURVEY**

#### **2.1 Existing Problem:**

Due to population growth, urbanization ,and climatic change ,competition for water resources is expected to increase, with a particular impact on agriculture, river water. Water will be suitableness to potable water monitoring compound spillage identification done rivers, remote estimation for swimming pools. It holds self-sufficient hubs that unite with the cloud to ongoing water control .The River water needed to be treated before it is used in agriculture fields, hence the parameters affecting the quality of river-water need to be analyed and to be used for water treatment purpose.

#### **2.2 References:**

1. K.S. Adu-Manu, C. Tapparello, W. Heinzelman, F.A. Katsriku, J.-D. Abdulai

Water quality monitoring using wireless sensor networks: Current trends and future research directions ACM Transactions on Sensor Networks (TOSN) (2017).

2. S. Thombre, R.U. Islam, K. Andersson, M.S. Hossain

**IP** based Wireless Sensor Networks: performance Analysis using Simulations and Experiments. Journal of Wireless Mobile Networks, Ubiquitous Computing, and Dependable Applications, 7 (2016).

3. Rushikesh Kshirsagar, R.Mudhalwadkar, Saish Kalaskar

**Design and Development of IoT Based Water Quality Measurement System.** The idea about low-cost IOT based portable approach for water quality measurements system. Because of its low-cost approach, everyone can afford to use it to determine quality of water(2019).

4. N. Vijayakumar, R. Ramya

The real time monitoring of water quality in IoT environment. The parameters such as temperature, PH, turbidity, conductivity, dissolved oxygen of the water can be measured. The measured values from the sensors can be processed by the core controller. The raspberry PI B+ model can be used as a core controller (2015).

5. M.Chitra, D. Sadhihskumar, R. Aravindh, M. Murali, R. Vaittilingame

**IoT based Water Flood Detection and Early Warning System.** The collected information (data) from the water level sensor and temperature and humidity sensor passed to Thing view Android application in order to find the flow graph level of the water level in the river and temperature, humidity values and sends SMS to the registered contact mobile numbers (2020).

6. Dr.Geetha

#### IoT based real time water quality monitoring system using smart sensor

WQM is a cost effective and efficient system designed to monitor drinking water quality with the help of IOT(2020).

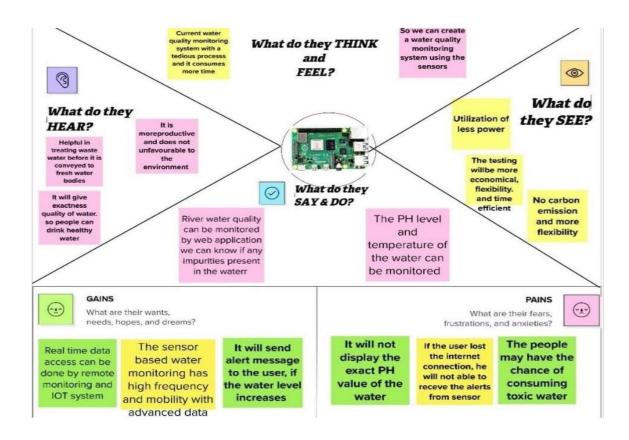
#### **2.3 Problem Statement:**

The reduce the river water pollution and to monitor the parameters of river water and control measures can impact vegetation ,health. The Real time analysis of Indicators of River water (Ph, salinity ,nutrients, etc...)

#### **IDEATION & PROPOSED SOLUTION**

#### 3.1 Empathy Map Canvas:

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes. It is a useful tool to helps teams better understand their users. Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.

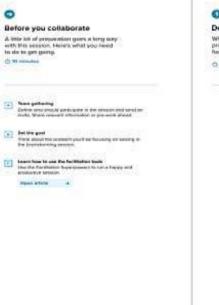


### 3.2 Ideation & Brainstorming:

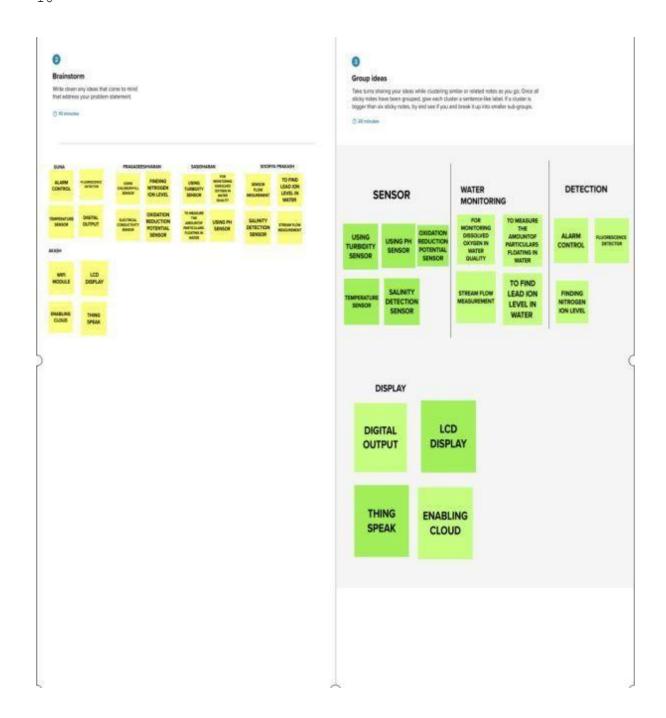
Brainstorming provides a free and open environment that encourages everyone within a team to participate in the creative thinking process that leads to problem solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate, helping each other develop a rich amount of creative solutions.

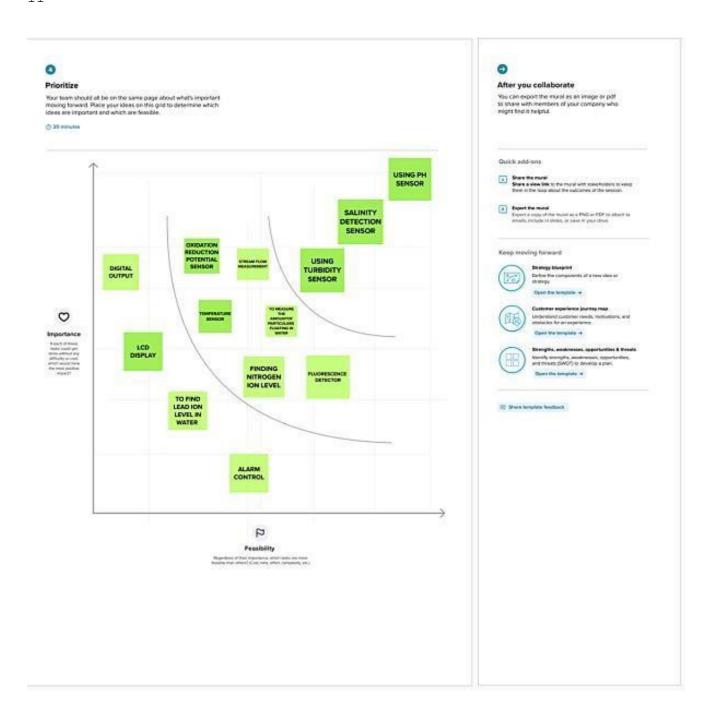
Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.









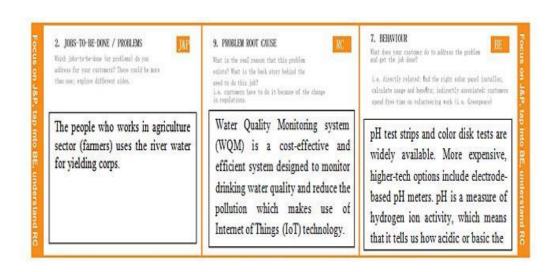


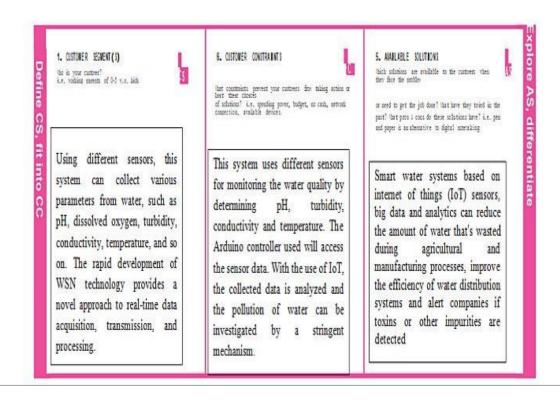
## 3.3 Proposed Solution:

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Due to population growth,urbanization,and climatic change,competition for water resources is expected to increase,with a particular impact on agriculture,river water.
2.	Idea / Solution description	To monitor the water supply we implement IoT (Internet of Things)setup, for river water quality monitoring systems periodically checks, dust particles, temperature and PH level by sensors and notifies for public when the water quality vaires.
3.	Novelty / Uniqueness	We use water detection sensor has unique advantage. It consumes less time to monitor than a manual method for checking polluted levels, and notifies immediately to reduce affected rate of pollution in water.
4.	Social Impact / Customer Satisfaction	People who are living in rural areas near to the river will be very satisfied with our idea. It will be useful to monitor water pollution in specific area. So this system prevent people from water pollution. It will be used for farming purpose to check quality water, temperature and PH level. Our Impact of this project is also create a social satisfaction for farmers too.

	Business Model	It costs low compared to other model.Our real
	(Revenue Model)	time quality monitoring model has sensors
5.		easily helps to monitor and predict the affected
		water scale easily in farming, drinking
		water,aquaculture,and other industries.It notifies
		by sending directly to the corporation and they
		can further notify the people to aware
		immediately.Quick actions can be taken.With
		the help of efficient use of mobile network,IoT
		and continuous monitoring it will be
		revolutionized model.
6.	Scalability of the Solution	Checking the river water quality for providing
		clean drinking water for the people, farming,
		promoting aquaculture, and other industries. It
		is the best replacement for checking water
		quality in laboratories and it is user-friendly.If
		we add more advanced sensors in future it can
		be used to monitor multiple levels in water.It
		will show continuous real time values in
		maintaining the quality of water.

#### 3.4 PROBLEM SOLUTION:







#### BEFORE:

- Before implementing this IOT project people faced some difficulties to enjoy boating, fishing, and provision safe drinking.
- They also face major problems in the development of industrial, hydroelectric, and agricultural water requirements in the water quality.

#### AFTER:

 After implementing this project people can be able to overcome all these above-mentioned difficulties easily with this...

#### 10. YOUR SOLUTION

If you are working on an existing business, write down your connect solution first, it! I in the curvas, and sheek her such it is to realistic if you are working on a me business proposition, then believe it black would you fill in the colones and some us with a solution that its within continues limitations, solves a problem and authors continues behaviors.

Water quality monitoring is demarcated as the assortment of data at set or desired places and at periodic intervals for providing information that might be accustomed to describe present conditions of water. The objectives of smart water quality monitoring system are:

- 1.To measure perilous quality metrics like physical, chemical and microbial properties.
- 2.To find the deviations in measured metrics and give timely warning in recognition threats or hazards.

#### 8. CHANNELS OF EMAYIOUR

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#### ONLINE:

- Public may provide review and rating for the system.
- The software used should be properly studied by everyone to operate it.

#### OFFLINE:

- Connectivity. This doesn't need too much further explanation.
- Things. Anything that can be tagged or connected as such as it's designed to be connected.

## **4 REQUIREMENT ANALYSIS**

## 4.1 Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	<b>Functional Requirement</b>	Sub Requirement (Story / Sub-Task)
	(Epic)	
FR-1	User Registration	Registration through Form
		Registration through Gmail
		Registration through LinkedIN
FR-2	User Confirmation	Confirmation via Email
		Confirmation via OTP
FR-3	Ultrasonic generator	Periodically the waves are generated to
		destroy algae in the range of
		25%,50%,100%
FR-4	Ph level detection	To observe the water quality, Ph sensor
		is used and the
		signals are conveyed to the Arduino.
FR-5	Turbidity detection	Turbidity sensor measures the purity
		of element or marshy utter in the water
		and the signals are delivered
		to Arduino

## 4.2 Non-functional Requirements:

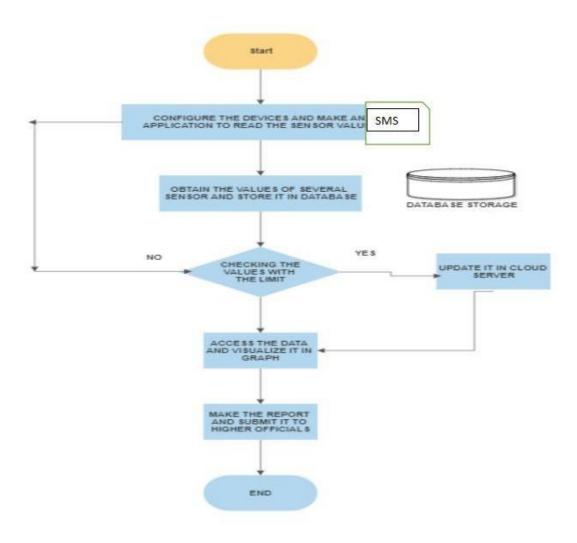
Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Monitors the flow and quality of
		ground water, and investigates
		surface- and ground-water
		interactions.
NFR-2	Security	The data and information are secured
		in the application by using the
		application firewall.
NFR-3	Reliability	The Real time sensor output values
		with future predicted data storage
		with output efficiency of 98%. It also
		gives certainty for aquaculture safety.
NFR-4	Performance	The performance of system has higher
		efficiency and environmental friendly.
NFR-5	Availability	It is available in the form of mobile UI
		24 x 7 monitoring system.
NFR-6	Scalability	The system has high scalability. Able
		to be changed in size or scale to give
		the best output.
NFR-7	Stability	The ability of the system to bring itself
		back to its stable configuration. The
		stability is high.
NFR-8	Efficiency	The monitoring system is highly
		efficient,high mobility with
		consumption of power.

#### **5 PROJECT DESIGN**

### **5.1 Data Flow Diagrams:**

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.



### **5.2 SOLUTION AND TECHNICAL ARCHITECTURE**

## Summary

This code pattern explains how to build an IOT based river water monitoring and controlling system with some predefined values.

### Flow

- Feed the data received from the Sensor unit which are placed in the river sides.
- The collected data will be displayed in the Web page to the user.
- Then the collected data is sent to the data base, where the collected data and the predefined data are checked and monitored.
- If any data exceed the predefined data then the control signal will send to the Admin.
- The collected data will be stored in the IBM cloud storage. Later the data will be controlled by the admin via Web UI.

## **Components & Technologies:**

S.No	Component	Description	Technology
1.	Sensor Data	The data is collected form	ESP32Wifi module
		the various sensor placed	Raspberry Pie.
		in the river sides.	
2.	Database for Storage	The data/info need to be	MySQL-Oracle
		stored for accessing it in	
		future	
3.	File Storage	File storage requirements	IBM Block Storage or
			Other Storage Service
			or Local Filesystem
4.	Cloud Database	Database Service on	IBM cloud
		Cloud	
5.	Data Storage	File storage requirements	IBM Block Storage

## **Application Characteristics:**

S.No	Characteristics	Description	Technology
1.	PH level Monitoring	The PH level of river water can be monitored via placing sensors in rivers.	PH-sensor
2.	Air Quality Monitoring	The clarity and purity of river water can bemonitored	Surface Mount Sensor
3.	Temperature Monitoring	The temperature of river water can be monitored	Temperature sensor
4.	Water Treatment	can be used as both a safety device in the water purification process as carbon dioxide, methane, and carbon monoxide are some of the key gases produced during the treatment process	NDIR gas sensors
4.	Soil Condition Monitoring	Soil condition monitoring sensors allow farmers to collect data about rainfall, temperature, and other metrics over time to track trends and predict irrigation needs.	Acoustic sensor

## **5.3** User Stories

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

User Type	Functional Requiremen t (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account /dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through Google	I can register & access the dashboard with Google Login	Low	Sprint-2
		USN-4	As a user, I can register for the application through G mail	I can access through Gmail	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password	Login Details are received to me.	High	Sprint-1
	Interface	USN-6	As a user, I can log into the application by entering email & password.	Easy Access application	High	Sprint-1
Customer (Web user)	Dashboard	WUSN-7	As a web User, I can get all information (data)(Temp etc)	I can easily Understand how to use it.	High	Sprint-1
Customer Care Executive	View Perspective	CCE	As a Customer care, I can view the data in graph plots	Easy Understanding of Graphs	High	Sprint-1
Administrator	Risk factor	ADMIN- 1	As a Admin, Update must be done at each step and take care of any errors	Heavy Monitoing is Required.	High	Sprint-2

## 6. PROJECT PLANNING AND SCHEDULING

## **6.1 SPRINT PLANNING & SCHEDULING:**

TITLE	DESCRIPTION	DATE
Literature Survey & Information Gathering	Literature survey on the selected project is done by gathering information about related details on technical papers and web browsing.	06 OCTOBER 2022
Empathy Map	Prepared Empathy Map Canvas to combine thoughts and pains, gains of the project with all team members.	08 OCTOBER 2022
Ideation	Brainstorming session is conducted with all team members to list out all the ideas and prioritise the top 3 ideas.	09 OCTOBER 2022
Proposed Solution	Prepared the proposed solution document, which includes the novelty, feasibility of idea, business model, social impact, scalability of solution, etc.	2022
Problem Solution Fit	Prepared problem - solution fit document.	30 OCTOBER 2022

## **6.2 SPRINT DELIVERY SCHEDULE**

## Product Backlog, Sprint Schedule, and Estimation

Sprint	Functional Requirement (Epic)	User Story Numb er	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	2	High	A.Aswini K.S.Deepa S.Harini Dhanusha
	Registration via facebook	USN-3	As a user, I can register for the application through Facebook	2	Low	
	Registration via Mail ID	USN-4	As a user, I can register for the application through Gmail	2	Medium	
Sprint-2	Confirmation	USN-2	As a user, I will receive confirmation email once I have registered for the application	1	High	
	Login	USN-5	As a user, I can log into the application by entering email & password	1	High	
	IBM Cloud service access		Get access to IBM cloud services.	2	High	

Sprint-3	Create the IBM Watson IoT and device Settings	USN-6	To create the IBM Watson IoT Platform and integrate the microcontroller with it, to send the sensed dataon cloud	2	High	Dhanusha Harini
	Create a node red service	USN-7	To create a node red service to integrate the IBM Watson along with the Web UI	2	Medium	Aswini Deepa
	Create a Web UI	USN-8	To create a Web UI, to access the data from the cloud and display all parameters.	2	Medium	Aswini Harini
	To develop a Python code	USN-9	Create a python code to sense the physical quantity and store data.	2	Medium	Dhanusha Deepa

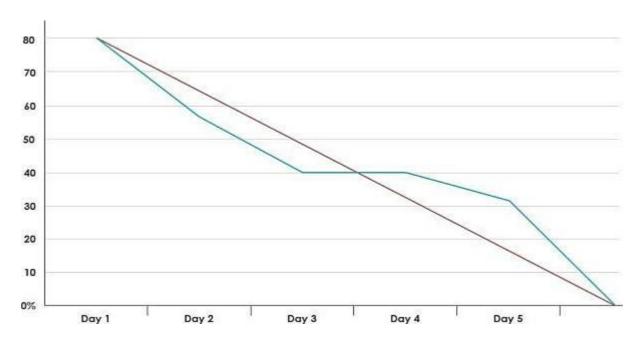
## Project Tracker, Velocity & Burndown Charts

Sprint	Total Story Point s	Durati on	Sprin t Start Date	Sprint End Date (Planned )	Story Points Complete d (as on Planned End Date)	Sprint Release Date (Actual)
Sprint -1	20	6 Days	24 Oct 2022	29 Oct 2022	20	27 Oct 2022
Sprint -2	20	6 Days	28 Oct 2022	04 Nov 2022	30	30 Oct 2022
Sprint -3	20	6 Days	03 Nov 2022	10 Nov 2022	49	04 Nov 2022
Sprint -4	20	6 Days	08 Nov 2022	15 Nov 2022	50	09 Nov 2022

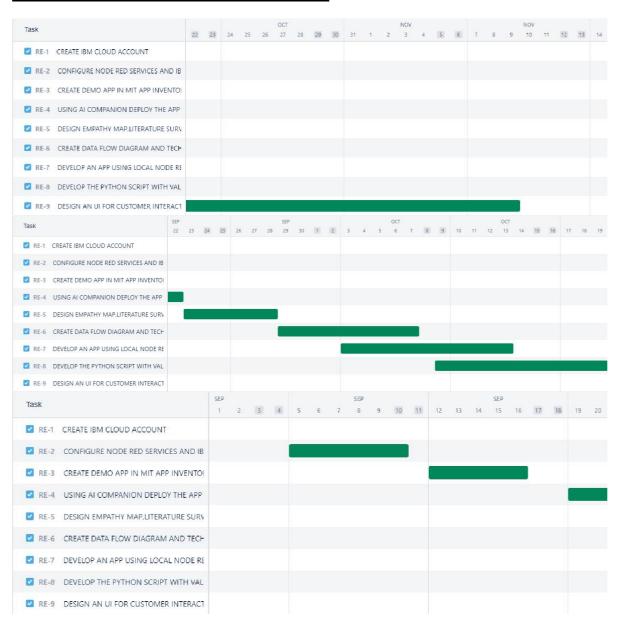
## Velocity:

$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{10} = 2$$

#### **Burndown Chart:**



#### TIMELINE CREATED USING JIRA SOFTWARE



#### LISTS IN JIRA:

# Key	<b>■</b> Summary	Status	<b>≡</b> Category
RE-1	CREATE IBM CLOUD ACCOUNT	DONE	PREREQUISITE
RE-2	CONFIGURE NODE RED SERVICES AND IBM WATSON IOT PLA	DONE	PREREQUISITE
RE-3	CREATE DEMO APP IN MIT APP INVENTOR 2.	DONE	MOBILE APPLICATION
RE-4	USING AI COMPANION DEPLOY THE APP IN MOBILE	DONE	DEPLOYMENT AND TESTING
RE-5	DESIGN EMPATHY MAP, LITERATURE SURVEY FOR OUR PROJE	DONE	IDEATION PHASE
RE-6	CREATE DATA FLOW DIAGRAM AND TECHINICAL ARCHITECT	DONE	PHASE 1
RE-7	DEVELOP AN APP USING LOCAL NODE RED AND DEPLOY IT T	DONE	SPRINT DETAILS
RE-8	DEVELOP THE PYTHON SCRIPT WITH VALID DEVICE CREDEN	DONE	SPRINT DETAILS
RE-9	DESIGN AN UI FOR CUSTOMER INTERACTING AND GET IT FO	DONE	SPRINT DETAILS

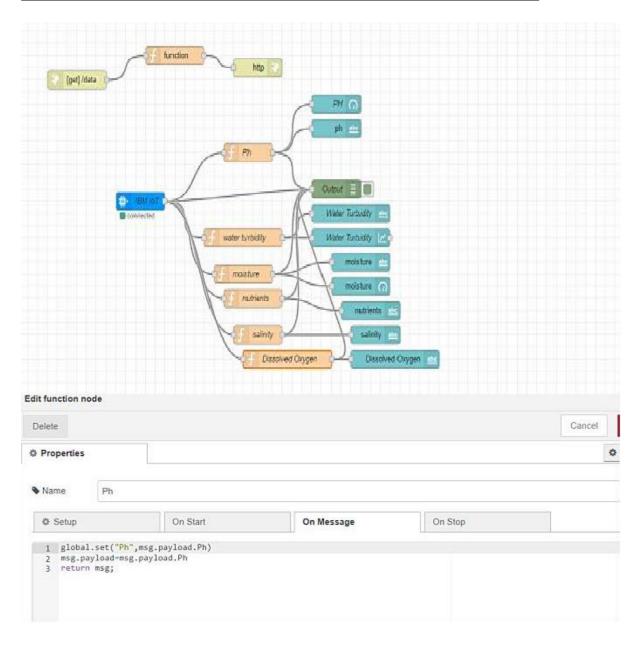
### ISSUES :

Name =	Type \$	Related Schemes	
ERROR IN MSG PAYLOAD EVENTS	Base	Default Issue Type Scheme	
□ ISSUE IN CONFIGURING NODE RED DASHBOARD	Base	Default Issue Type Scheme	
ERROR 1101 IN MIT APP INVENTOR	Subtask	Default Issue Type Scheme	
URL NOT RESPONDED  THE NODE RED DATA URL NOT RESPONDED	Subtask	Default Issue Type Scheme	

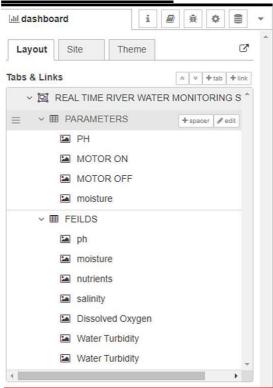
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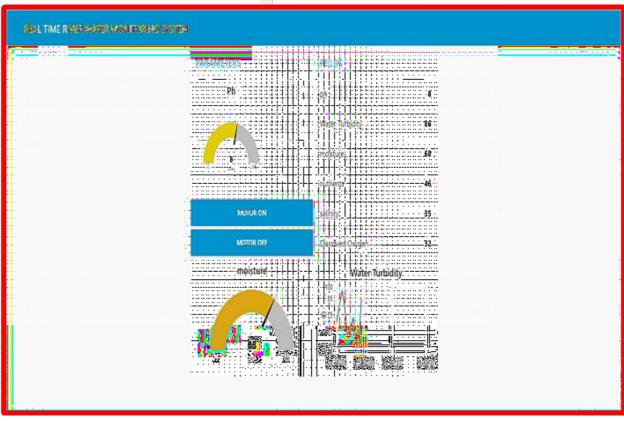
### **CODING AND SOLUTIONING**

## 7.1 NODE RED SERVICE ASSOCIATED WITH IBM CLOUD:



Node red Dashboard:





## 8. TESTING

## **8.1** Test Case Analysis

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

Section	Total Cases	Not Tested	Fai l	Pass
Print Engine	15	0	0	15
Client Application	45	0	0	45
Security	1	0	0	1
Outsource Shipping	2	0	0	2
Exception Reporting	10	0	0	10
Final Report Output	4	0	0	4
Version Control	3	0	0	3

#### 8.2 USER ACCEPTANCE TESTING:

## 1. Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the REAL TIME RIVER WATER QUALITY MONITORING AND CONTROL SYSTEMS project at the time of the release to User Acceptance Testing (UAT).

## 2. Defect Analysis

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

Resolutio n	Severit y 1	Severit y 2	Severit y 3	Severi ty 4	Subtotal
By Design	9	5	4	3	21
Duplicate	2	0	2	0	4
External	3	4	1	2	10
Fixed	10	1	5	17	33
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	2	3
Won't Fix	0	3	3	1	7
Totals	24	13	17	25	79

## 9. <u>RESULT</u>

## 9.1 PERFROMANCE METRICS:

			40	NFT - F	R <mark>isk Assessme</mark>	nt			
.No	Project Name	Scope/feature	Functional Changes	Hardware Changes	Software Changes	Impact of Downtime	Load/Voluem Changes	Risk Score	Justification
	REAL TIME RIVER WATER QUALITY MONITORING AND CONTROL SYSTEM				17				As we have seen the
1		New	Low	No Changes	Moderate	3days	>5 to 10%	ORANGE	changes

### PERFORMANCE TABLE

PARAMETER	PERFORMANCE	DESCRIPTION
ADMIN TESTING	95%-100%	THE TESTING DONE
		BEFORE IT IS
		DEPLOYED AS AN APP
CUSTOMER	75-85%	THE CUSTOMER NEED
SATISFACTION		TO BE SATISFIED WITH
		THE MOBILE
		APPLICATION
USER INTERFACE	65-85%	THE APP CAN USED BY
		ANYONE.(EASE OF
		ACCESS)
SEVER RESPONSE	50-75%	url - response
DATA	60-80%	VALID DATA FROM
VALIDATION WITH	(15-30	THE APP
NO. OF TEST CASE	TESTCASE)	
ERROR	3-5%	REAL-TIME DELAY
		MAY OCCUR

**10.** 

## ADVANTAGES AND DISADVANTAGES

#### **ADVANTAGES:**

- The prototype developed for water quality maintenance is very beneficial for safeguarding public health and also adds to the clean environment.
- The automation of this water monitoring, cleaning and control process removes the need of manual labor and thus saves time and money.
- The automation of the system makes the control and monitoring process more efficient and effective. Real time monitoring on mobile phone which is possible through the interface of plc with Arduino and Bluetooth module allows remote controlling of the system.

### **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.
- The process is time consuming due to slow process of manual data collection from different locations of the water body.
- The method is prone to human errors of various forms.

11.

#### **CONCLUSION**

Thus our project is used to Monitoring of Turbidity, PH & Temperature of Water makes use of water detection sensor with unique advantage and existing GSM network. The system can monitor water quality automatically, and it is low in cost and does not require people on duty. So the water quality testing is likely to be more economical, convenient and fast. The system has good flexibility. Only by replacing the corresponding sensors and changing the relevant software programs, this system can be used to monitor other water quality parameters.

The operation is simple. The system can be expanded to monitor hydrologic, air pollution, industrial and agricultural production and so on. It has widespread application and extension value. By keeping the embedded devices in the environment for monitoring enables self protection (i.e., smart environment) to the environment. To implement this need to deploy the sensor devices in the environment for collecting the data and analysis. By deploying sensor devices in the environment, we can bring the environment into real life i.e. it can interact with other objects through the network.

Then the collected data and analysis results will be available to the end user through the Wi-Fi.

#### **FUTURE SCOPE**

We use water detection sensor has unique advantage. It consumes less time to monitor than a manual method for checking polluted levels, and notifies immediately to reduce affected rate of pollution in water. People who are living in rural areas near to the river will be very satisfied with our idea. It will be useful to monitor water pollution in specific area. So this system prevent people from water pollution.It will be used for farming purpose to check quality water, temperature and PH level. Our Impact of this project is also create a social satisfaction for farmers too. The scalabilty of this project gives the addition of more different type of sensors.By interfacing the relay we can control the supply of water. We can also a revenue model. This system could also implement as implemented in various industrial processes. The system can be modified according to the needs of the user and can be implemented along with lab view to monitor data on computers.

## **13.APPENDIX**

# 13.1 SOURCE CODE: PYTHON CODE TO PUBLISH DATA

```
#program to publish data in ibm watson iot platform import time import sys import ibmiotf.application import ibmiotf.device import random #Provide your IBM Watson Device Credentials
```

```
#Org_ID

organization = "84708c"

#Device Type

deviceType = "abcd"

#device ID

deviceId = "12345"

#Method of Authentication

authMethod = "token"

#Auth-token

authToken = "12345678"
```

```
# exception handling method
#try block
try:
    deviceOptions = {"org": organization, "type": deviceType, "id":
deviceId, "auth-method":authMethod, "auth-token":authToken}
    deviceCli= ibmiotf.device.Client (deviceOptions)
#to handle the errors
except Exception as e:
    print ("Caught evention connecting device: %s" % str(e))
    sys.exit()
#device connection
deviceCli.connect()
#while Loop for getting the values
while True:
  Ph=random.randint (6,8)
  WaterTurbidity=random.randint (15,100)
  salinity=random.randint (500,1000)
  DissolvedOxygen=random.randint (60,130)
  conductivity=random.randint (100,1200)
  data = \{'Ph' : Ph,
'WaterTurbidity':WaterTurbidity,'salinity':salinity,'DissolvedOxygen':
DissolvedOxygen,'conductivity':conductivity}
```

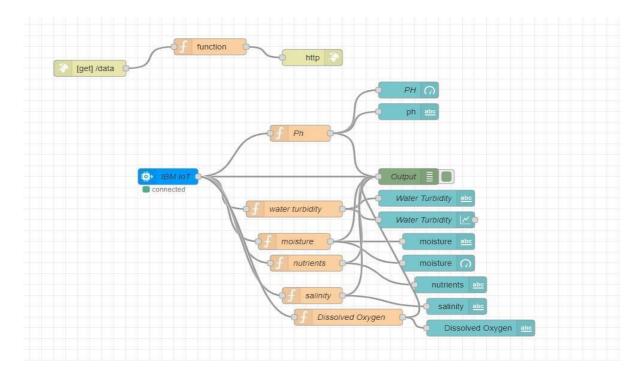
```
#define myonpublishcallback function
  def myonPublishCallback():
    print ("Published Ph = %s" % Ph, "WaterTurbidity = %s %%" %
WaterTurbidity, "salinity = %s" % salinity, "DissolvedO2 = %s" %
DissolvedOxygen,"conductivity = %s" % conductivity)
    if(Ph<7.4 and salinity < 600 and DissolvedOxygen < 80 and
conductivity < 200):
      if(Ph>7.4 and salinity > 900 and DissolvedOxygen > 120 and
conductivity > 1100):
         print("UNSAFE, THE VALUES OF PARAMETERS ARE
NOT IN THE RANGE")
    else:
      print("Quality of River water is measured and its correct")
  success = deviceCli.publishEvent("IoTSensor", "json", data, gos=0,
on_publish = myonPublishCallback)
  if not success:
    print("Not connected to IOTF")
  #sleep time
  time.sleep(10)
#disconnect device
deviceCli.disconnect()
```

#### **OUTPUT**

```
Type "copyright", "credits" or "license()" for more information.
         ======= RESTART: E:\IBM PROJECTS\ibmpublish.py ==
2022-11-17 20:42:47,069 ibmiotf.device.Client
                                                     INFO
                                                            Connected successfully: d:84708c:a
Published Ph = 8 WaterTurbidity = 54 % salinity = 862 DissolvedO2 = 81 conductivity = 175
Ouality of River water is measured and its correct
                                                                                           *Python 3.7.0 Shell*
                                                                                                )
File Edit Shell Debug Options Window Help
Quality of River water is measured and its correct
Published Ph = 6 WaterTurbidity = 80 % salinity = 652 DissolvedO2 = 123 conductivity = 306
Ouality of River water is measured and its correct
Published Ph = 8 WaterTurbidity = 57 % salinity = 579 DissolvedO2 = 121 conductivity = 459
Quality of River water is measured and its correct
Published Ph = 7 WaterTurbidity = 85 % salinity = 703 DissolvedO2 = 106 conductivity = 165
Quality of River water is measured and its correct
Published Ph = 8 WaterTurbidity = 61 % salinity = 872 DissolvedO2 = 124 conductivity = 892
Quality of River water is measured and its correct
Published Ph = 6 WaterTurbidity = 75 % salinity = 934 DissolvedO2 = 119 conductivity = 351
Ouality of River water is measured and its correct
Published Ph = 7 WaterTurbidity = 65 % salinity = 732 DissolvedO2 = 102 conductivity = 1104
Quality of River water is measured and its correct
Published Ph = 7 WaterTurbidity = 97 % salinity = 791 DissolvedO2 = 75 conductivity = 887
Quality of River water is measured and its correct
Published Ph = 8 WaterTurbidity = 47 % salinity = 992 DissolvedO2 = 111 conductivity = 770
Quality of River water is measured and its correct
Published Ph = 8 WaterTurbidity = 23 % salinity = 570 DissolvedO2 = 73 conductivity = 135
Quality of River water is measured and its correct
Published Ph = 6 WaterTurbidity = 76 % salinity = 516 DissolvedO2 = 88 conductivity = 226
Quality of River water is measured and its correct
Published Ph = 8 WaterTurbidity = 23 % salinity = 754 DissolvedO2 = 127 conductivity = 1101
Quality of River water is measured and its correct
     Device ID
                      Status
                                      Device Type
                                                    Class ID
                                                               Date Added
                                                                                    Descriptive Location
                        Connected
                                                     Device
                                                                Nov 9, 2022 9:43 PM
         Identity
                  Device Information
                                   Recent Events
                                                State
                                                        Logs
```

The recent events listed show the live stream of data that is coming and going from this device.

Event	Value	Format	Last Received
IoTSensor	{"Ph":6,"WaterTurbidity":34,"salinity":605,"Disso	json	a few seconds ago
IoTSensor	{"Ph":7,"WaterTurbidity":48,"salinity":871,"Disso	json	a few seconds ago
event_1	{"Water_Turbidity":41,"Ph":1,"moisture":51,"nutr	json	a few seconds ago
IoTSensor	{"Ph":8,"WaterTurbidity":88,"salinity":729,"Disso	json	a few seconds ago
IoTSensor	{"Ph":6,"WaterTurbidity":23,"salinity":504,"Disso	json	a few seconds ago



## **HTML CODE:**

```
<!DOCTYPE html>
<html lang="en">
<head>
  <style>
  h1 {text-align: center;}
  p {text-align: center;}
  div {text-align: center;}
  body {
   background-image: url("https://thumbs.dreamstime.com/b/clear-transparent-light-blue-
water-pool-texture-background-150961732.jpg");
   background-color: #ccccc;
   }
  </style>
  <meta charset="UTF-8">
  <meta http-equiv="X-UA-Compatible" content="IE=edge">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <title>Login page in HTML</title>
</head>
<body>
```

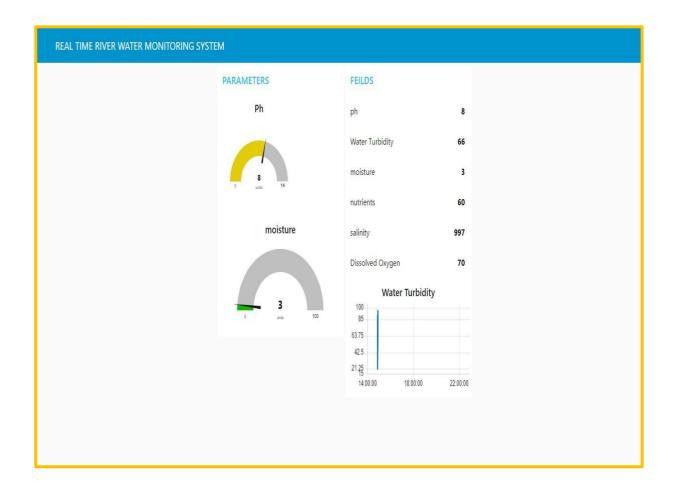
```
<h1>Login Page</h1>
  <form action="">
    <!-- Headings for the form -->
    <div class="headings Container">
      <h3>Sign in</h3>
      Sign in with your username and password
    </div>
    <!-- Main container for all inputs -->
    <div class="main Container">
      <!-- Username -->
      <label for="username">Your username</label>
      <input type="text" placeholder="Enter Username" name="username" required>
      <br>><br>>
      <!-- Password -->
      <label for="pswrd">Your password</label>
      <input type="password" placeholder="Enter Password" name="pswrd" required>
      <!-- sub container for the checkbox and forgot password link -->
      <div class="subcontainer">
         <label>
          <input type="checkbox" checked="checked" name="remember"> Remember me
         </label>
          <a href="#">Forgot Password?</a>
      </div>
      <button type="submit" onclick="window.location.href = 'https://node-red-qltdp-2022-
11-07.eu-gb.mybluemix.net/ui';">Login</button>
```

<!-- Sign up link -->

</html>

Not a member? <a href="#">Register here!</a>
</div>

</form>
</body>



## **13.2 GIT-HUB LINK:**

https://github.com/IBM-EPBL/IBM-Project-33685-1660225350.git