REAL – TIME RIVER WATER QUALITY CONTROL AND MONITORING SYSTEM

A NALAIYATHIRAN PROJECT REPORT

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INTRODUCTION

1.1PROJECT OVERVIEW:

Safe water is rapidly becoming a scarce resource thanks to the combined impact of increased population, pollution, and global warming. Speaking of water pollution, it is one of the biggest obstacles to green globalization.

To ensure the continuous drinking water supply, its quality needs to be monitored in real-time. Traditionally used laboratory-based testing techniques are time-consuming and costly because they must be undertaken manually.

Even though water monitoring systems have seen some advancement, they utilize the wireless sensor network or wireless network technology that comes with their share of problems, including weakness in data security, communication coverage, and energy consumption management.

That is why the Internet of Things (IoT) has been a boon in this regard, as it enables the current developments of more efficient, secure, and cost-effective systems with real-time capabilities.

1.2 PURPOSE:

SWQM is the process of measuring the water quality parameters, such as temperature, pH, turbidity, dissolved oxygen levels, variety of ions present,

and so on. The main objective of monitoring water quality is to ensure these parameters are within a suitable range.

The traditional method of water monitoring was done physically, using only chemicals. A water quality monitoring application involves using different IoT-based smart sensors that keep track of the parameters in real-time.

LITERATURE SURVEY

Real Time Water Quality Monitoring System Using IoT

AUTHORS: Mayuri Malunjkar, Sadhana Mare, Monika Nagawade

There is need for effective monitoring, evaluation and control of water quality in different areas. Ensuring safe water supply of drinking water is big challenge for today's generation. The excessive use of fertilizers in farms and
also, in other sectors such as mining and construction have contributed in overall reduction of water quality. To ensure the safe supply of the drinking water the quality needs to be monitor. So, we can give a design and development of a low-cost system for real time monitoring of the water quality using IoT (Internet of Things) and the system include of different sensors is used for measuring physical and chemical parameters of the water.

ADVANTAGES:

- Due to automation, it will reduce the time to check the parameters.
- This is economically affordable for common people
- Provides the prevention from diseases caused by water

● Accuracy in measurement
● SMS alert is sent to the user

IoT Based Real-time River Water Quality Monitoring System

AUTHOR: Mohammad Salah Uddin Chowdury, Talha Bin Emran, Subhasish Ghosh

As real time water quality monitoring is emerging all over the world. From drinking water to industrial waste water. In this general water quality parameters are total Organic carbon, Residual Chlorine, Conductivity, pH, Turbidity. Various types of parameters are measured with sensors by placing them into different solutions of water. Data generated is compared with standard values in cloud and if exceeds then message sent from cloud to the users mobile. The given paper presents a detailed information of recent works carried out in smart water quality monitoring. Also, a power efficient, simpler solution for in pipe water quality monitoring based on Internet of Things technology is presented.

Real-Time Water Quality Monitoring System

AUTHORS: Jyotirmaya Ijaradar, Subhasish Chatterjee

The need for effective and efficient monitoring, evaluation and control of water quality in residential area has become more demanding in this era of urbanization, pollution and population growth. Ensuring safe water supply of drinking water is big challenge for modern civilization. Traditional methods that rely on collecting water samples, testing and analyses in water laboratories are not only costly but also lack capability for

real-time data capture, analyses and fast dissemination of information to relevant stakeholders for making timely and informed decisions. In this paper, a real time water quality monitoring system prototype developed for water quality monitoring in Residential home is presented. The development was preceded by evaluation of prevailing environment including availability of cellular network coverage at the site of operation. The system consists of a Raspberry Pi, Analog to Digital Converter, Water quality measurement sensors. It detects water temperature, dissolved oxygen, pH, and electrical conductivity in real-time and disseminates the information in graphical and tabular formats to relevant stakeholders through a web-based portal and mobile phone platforms. The experimental results show that the system has great prospect and can be used to operate in real world environment for optimum control and protection of water resources by providing key actors with relevant and timely information to facilitate quick action taking.

The system developed in this paper is generally used for testing water samples and the data uploaded over the Internet are analyzed. The paper presents a detailed survey on the different techniques implemented in existing smart water quality

monitoring systems. Also, a low cost, less complex water quality monitoring system is proposed.

Water Quality Monitoring System Based on IOT

AUTHORS: Vaishnavi V. Daigavane, Dr. M.A Gaikwad

In the 21st century, there were lots of inventions, but at the same time were pollutions, global warming and so on are being formed, because of this there is no safe drinking water for the world's pollution. Nowadays, water quality monitoring in real time faces challenges because of global

warming limited water resources, growing population, etc. Hence there is need of developing better methodologies to monitor the water quality parameters in real time. The water quality parameters pH measures the concentration of hydrogen ions. It shows the water is acidic or alkaline. Pure water has 7pH value, less than 7pH has acidic, more than 7pH has alkaline. The range of pH is 0-14 pH. For drinking purpose, it should be 6.5-8.5pH. Turbidity measures the large number of suspended particles in water that is invisible. Higher the turbidity higher the risk of diarrhoea, cholera. Lower the turbidity then the water is clean. Temperature sensor measures how the water is, hot or cold. Flow sensor measures the flow of water through flow sensor. The traditional methods of water quality monitor involve the manual collection of water samples from different locations.

Smart Water Quality Monitoring System

AUTHORS: Vaishnavi V, Varshitha R C, Tejaswini M, Needhu Rebecca Biju

India is facing a major issue of natural resource exiguity, especially in case of water due to population growth and economic development . Most of the water bodies are contaminated due to the superfluous pollutants, which are mostly human-made. Thus certify the cleanliness of water is a major challenge. Rapid industrialization and greater emphasis on agriculture growth with latest technology, usage of more fertilizers and pesticides caused large impurity in aquatic surroundings directing to debasement of water quality and depletion of aquatic life. Water bodies are contaminated due to point and non-point sources of pollution, which include sewage discharge, discharge from industries, run-off from agricultural fields, urban run-off and even due to floods, droughts and lack of education and awareness amid users. The involvement of users in looking at the aspects like hygiene, environment sanitation, storage and disposal are

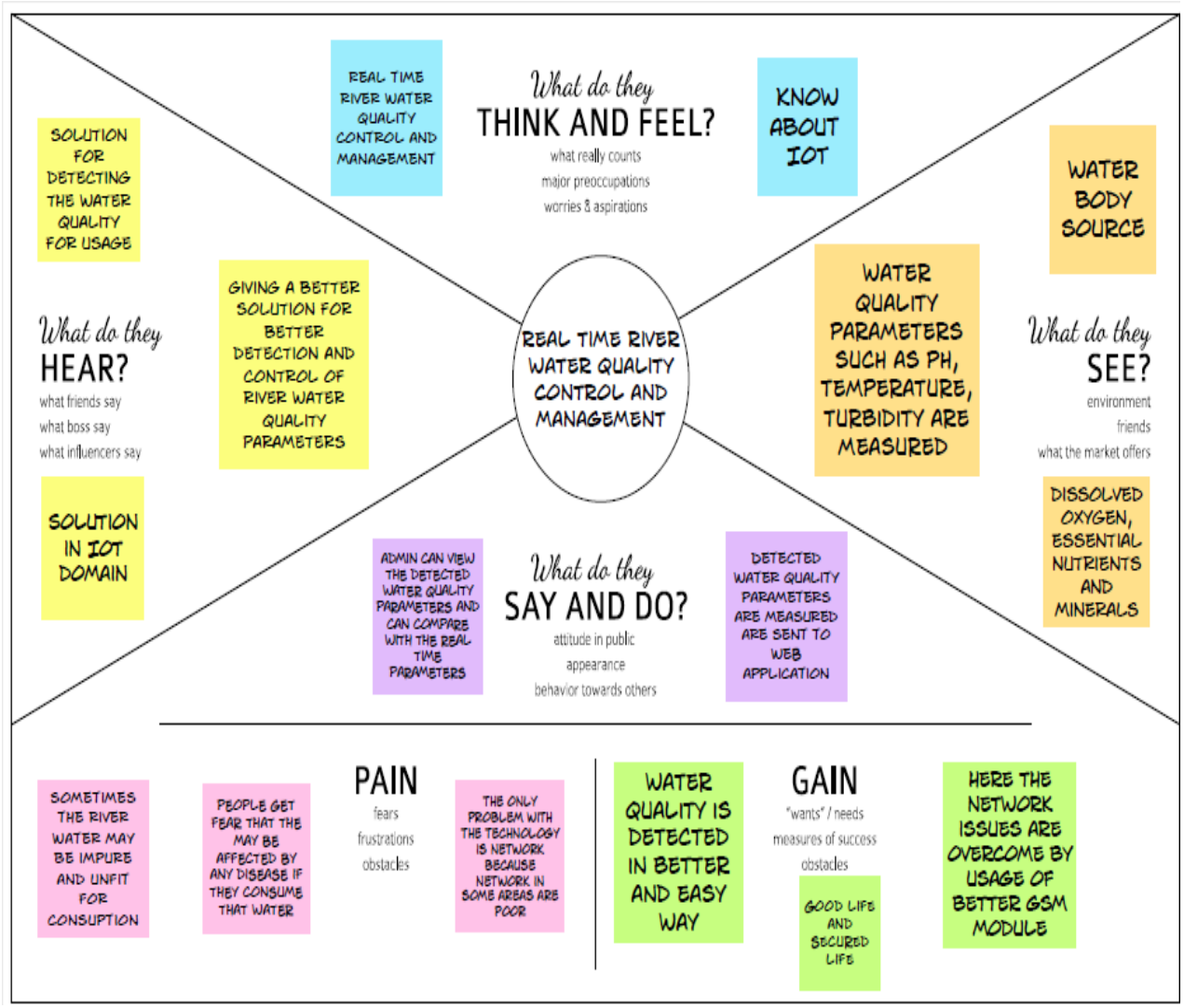
exceptive elements to uphold the quality of water bodies. The tonicity of lakes, rivers and other water bodies and their biological diversification are directly linked with the health of nearly every element of the ecosystem. Due to the use of befouled water by ecosystem components, the waterborne diseases are spreading over surroundings causing death and slowing down socio-economic progress. About 5 million people have died because of waterborne diseases all over the world (Water Resource Information System of India, 2017). Fertilizers and pesticides used for agriculture purpose can be washed by rain through soil, which ends up in water bodies. Industrial effluents are also washed into water bodies. These pollutants go into the food chain and gather till they reach noxious levels, ultimately killing birds, fish and mammals. For potable water, it should of high quality whereas for agriculture and industries the quality can be flexible. Industries use water from rivers to power machinery and for cooling down machinery Increment in water temperature diminishes the broke down oxygen level in water which influences the biotic life. (Central Ground Water Board, 2017) . The large portion of the above variables makes water quality checking more paramount in our biological system

3.PROBLEM STATEMENT DEFINITION:

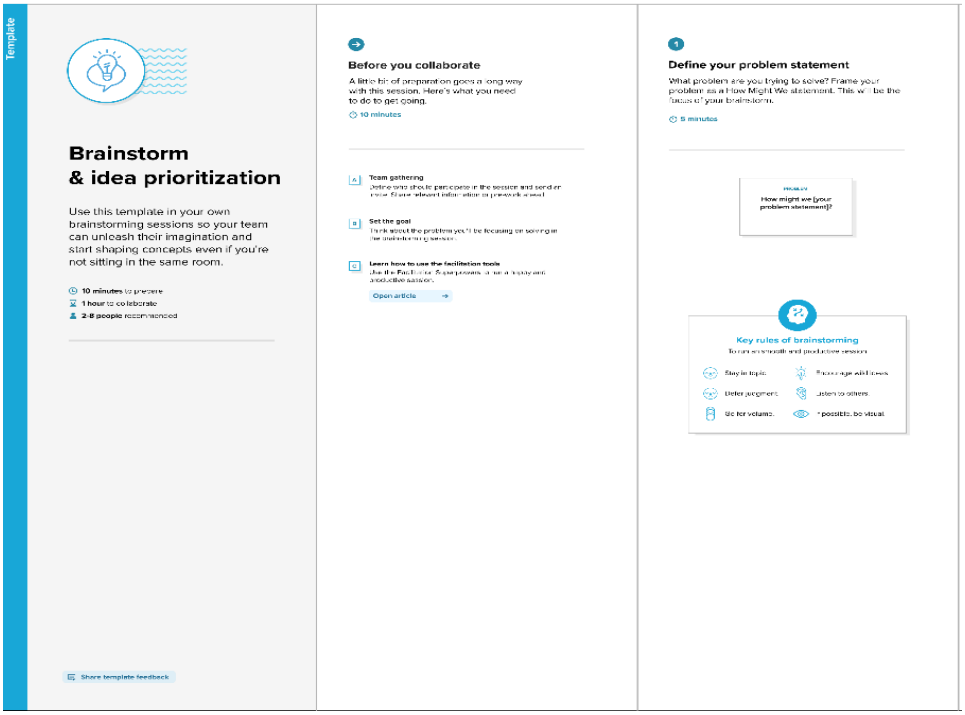
I am	Describe customer with 3-4 key characteristics – Who are they?	The customers may be the companies which are dependent on water as their primary resource and people who are going to consume the water
I'm trying to	List their outcome or "job" the care about – what are they trying to achieve?	To get clear water from the water resources
but	Describe what problems or barriers stand in the way – what bothers them most?	The water which is present in those water bodies are contaminated by the chemical fertilizers which are being used in the farm lands by farmers and polluted by the rapid growth of algae
because	Enter the "root cause" of why the problem or barrier exists – what needs to be solved?	The root cause of this problem is use of chemical fertilizers
which makes me feel	Describe the emotions from the customer's point of view – how does it impact them emotionally?	Sad worried and depressed

4. IDEATION & PROPOSED SOLUTION

4.1 Empathy Map Canvas



4.2 Ideation & Brainstorming

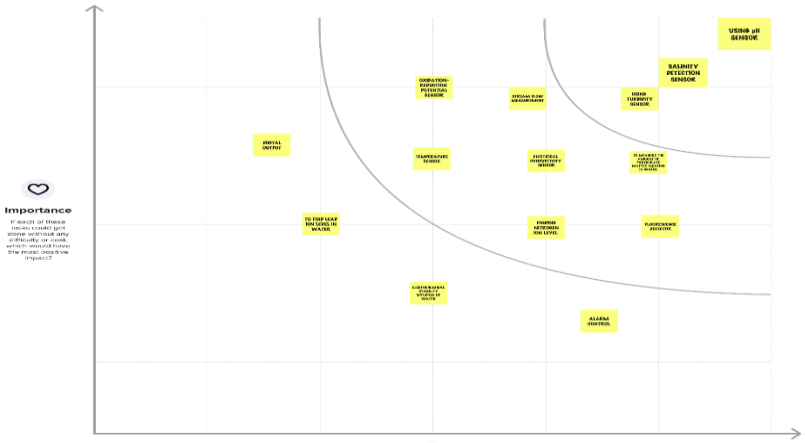


4

Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

20 minutes



After you collaborate

You can export the mural as an image or pdf to share with members of your company who might find it helpful.

Quick add-ons

A **Share the mural**
Share a view link to the mural with stakeholders to keep them in the loop about the outcomes of the session.

B **Export the mural**
Export a copy of the mural as a PNG or PDF to attach to emails, include in slides, or save in your drive.

Keep moving forward

Strategy blueprint
Define the components of a new idea or strategy.
Open the template →

Customer experience journey map
Understand customer needs, motivations, and obstacles for an experience.
Open the template →

Strengths, weaknesses, opportunities & threats
Identify strengths, weaknesses, opportunities, and threats (SWOT) to develop a plan.
Open the template →

Share template feedback

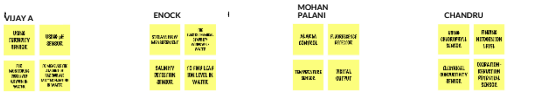
2

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!

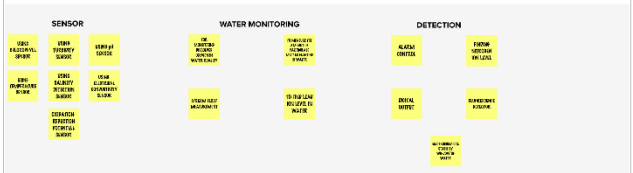


3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and split it up into smaller sub-groups.

20 minutes



4.3 Proposed Solution

S. No	Parameter	Description
1.	Problem Statement (Problem to be solved)	Pollution control. Water quality enhancement.
2.	Idea / Solution description	The device comprises of a micro controller interfaced with pH and turbidity sensors for measuring the pH and turbidity level of the water. The device is connected with the GSM module which notifies the water quality parameters as message to the board members. A Cloud storage is available for storing the collected data. A web application is created that is connected with cloud storage. Users can access the web application to check the water status of an area.
3.	Novelty / Uniqueness	The proposed solution comprises of a GSM module to notify the water quality parameters as message, which is the unique feature of the proposed solution.
4.	Social Impact / Customer Satisfaction	River pollution can impact all living organisms. Better monitoring and controlling measures can impact vegetation, health.
5.	Business Model (Revenue Model)	Revenue can be generated by selling the whole kit or they can sell the individual components as a replacement of damaged products. The revenue can also be obtained by the monitoring system as service where they can inspect the system, for that service they can charge the customers.
6.	Scalability of the Solution	Whatever may be the water quality either good or bad the device does not fail to give the result correctly

4.4 Problem Solution fit

Project Title: Real Time River Water Quality Control and Monitoring System

Project Design Phase – 1
Problem Solution Fit

Team Id: PNT2022TMID37794

5. REQUIREMENT ANALYSIS

5.1 Functional requirements

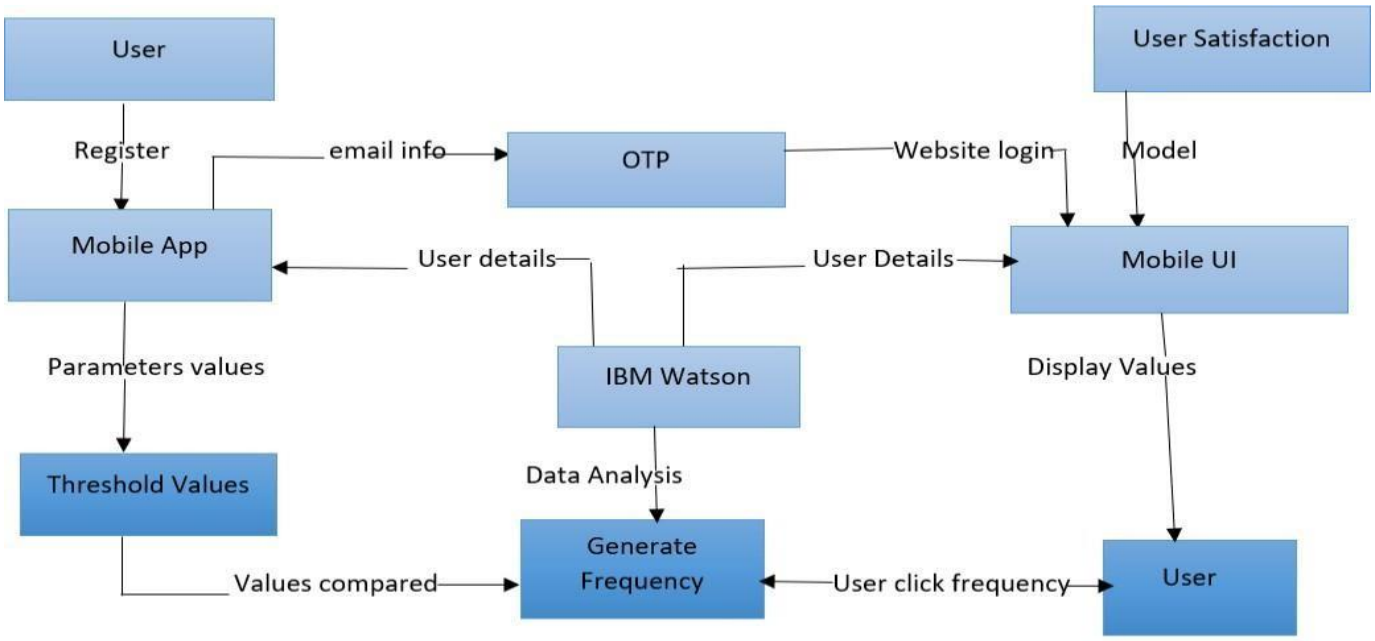
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail Registration through LinkedIN
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	pH level detection	Ph sensor is used to detect and signals send to Arduino. This sends SMS to mobile UI
FR-4	Turbidity Detection	Turbidity sensor is used to detect and signals send to Arduino. This sends SMS via mobile UI
FR-5	Ultrasonic Generator	Waves generated at regular interval times to clear algae 25% ,50%, 100%

5.2 Non - Functional requirements:

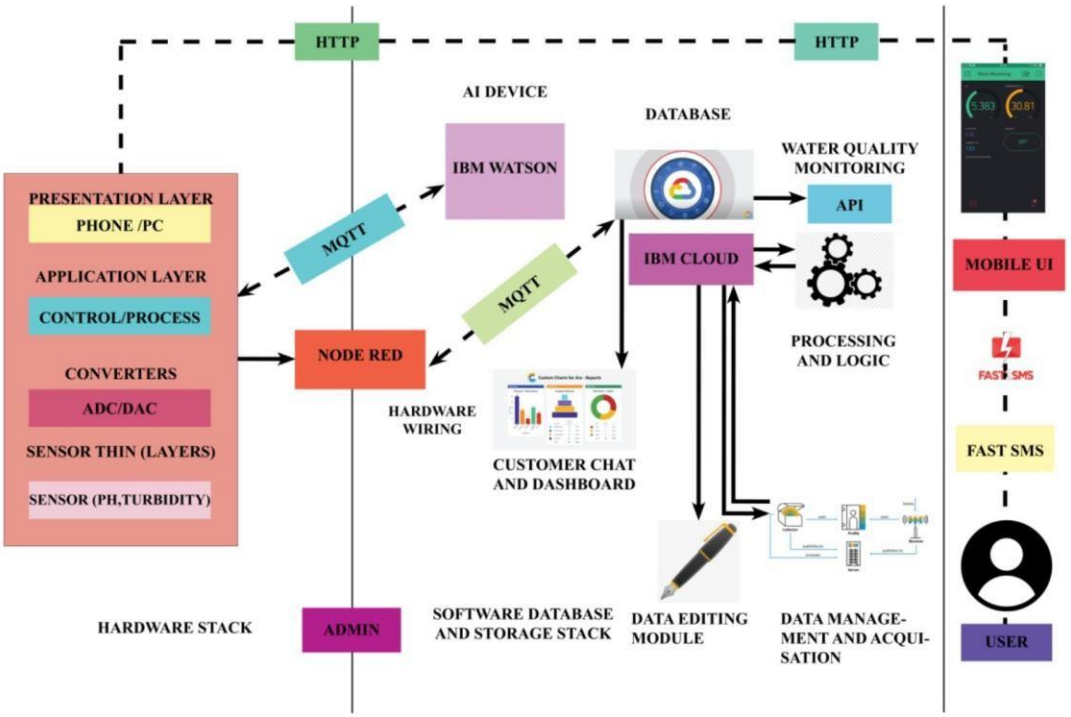
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Efficient to use and has a simple monitoring system.
NFR-2	**Security**	Mobile application is secured with firewall protection.
NFR-3	**Reliability**	Real time sensor output values with future predicted data storage.98% efficient monitoring output and 100% clearance of algae production. Assurance for aquaculture safety
NFR-4	**Performance**	Greater performance and environment safe model.
NFR-5	**Availability**	In form of mobile UI 24 x 7 monitoring system.
NFR-6	**Scalability**	Highly scalable. It is capable to produce a best final output.

6. PROJECT DESIGN

6.1 Data Flow Diagrams



6.2 Solution & Technical Architecture



6.3 User Stories

User Type	Functional Requirement(Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1	As a user, I can register for Mobile UI byentering my user details.	I can access my account /dashboard	High	Sprint-1
		USN-2	As a user, I will receive OTP from email once Ihave registered for the Mobile App	I can receive OTP & Enterconfirm	High	Sprint-1
		USN-3	As a user, I can see the parameters in themobile app UI	I can Analysis all thedetails	Medium	Sprint-2
		USN-4	As a user, I can click the frequency to controlthe water quality		Medium	Sprint-1
	Login	USN-5	As a user, I can monitor the water quality		High	Sprint-1
	Dashboard					
Customer Care Executive	Via calling	USN	On calling company's customer care center	Accepted by faster response	High	Sprint 4
Administrator	Registration	USN	By personalized setting of products	Accepted	High	Sprint-3

7. PROJECT PLANNING & SCHEDULING

7.1 Sprint Planning & Estimation

SI. NO	ACTIVITY TITLE	ACTIVITY DESCRIPTION	DURATION
1.	Understanding the project requirement	Assign the team members and create a repository in the GitHub Assign the task to each member and teach how to useand open and class the GitHub and IBM career education	1 WEEK
2.	Starting of project	Advise students to attend classes of IBM portals, create and develop a rough diagram based on project description and gather information on IOT and IBM projects and team leaders assign tasks to each member of the project	1 WEEK
3.	Attend class	Team members and team lead must watch and learn from classes provided by IBM and NALAYATHIRAN and must gain access of MIT license for their project.	4 WEEKS
4.	Budget and scope of project	Budget and analyze the use of IOT in the project and discuss with team for budget prediction to predict the favorability for the customer to buy.	1 WEEK

7.2 Sprint Delivery Schedule

Sprint	Functional Requirement (Epic)	User story Numb err	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	VIJAY A
	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 onceI have registered for the application	1	High	CHANDRU V
	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 data on Cloud	2	High	MOHAN KUMAR
	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	PALANI BHARATHI
	Create a Web UI	USN-8	To create a Web UI, to access the data from the cloud And display all parameters.	2	Medium	ENOCK
	To develop a Python code	USN-9	Create a python code to sense the physical quantity And store data.	2	Medium	VIJAY
	Publish Data to cloud.	USN-10	Publish Data that is sensed by the microcontroller to the Cloud	3	High	ENOCK
Sprint-4	Fast-SMS Service	USN-11	Use Fast SMS to send alert messages once the parameters like pH, Turbidity and temperature goes beyond the threshold	3	High	MOHAN KUMAR
	Testing	USN-12	Testing of project and final deliverables	3	Medium	PALANI BHARATHI

Project Tracker, Velocity & Burn down Chart: (4 Marks)

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	7 Days	24 Oct 2022	01 Nov 2022	20	01 Nov 2022
Sprint-2	20	5 Days	02 Nov 2022	07 Nov 2022	20	07 Nov 2022
Sprint-3	20	10 Days	08 Nov 2022	18 Nov 2022	20	18 Nov 2022
Sprint-4	20	9 Days	19 Nov 2022	28 Nov 2022	20	28 Nov 2022

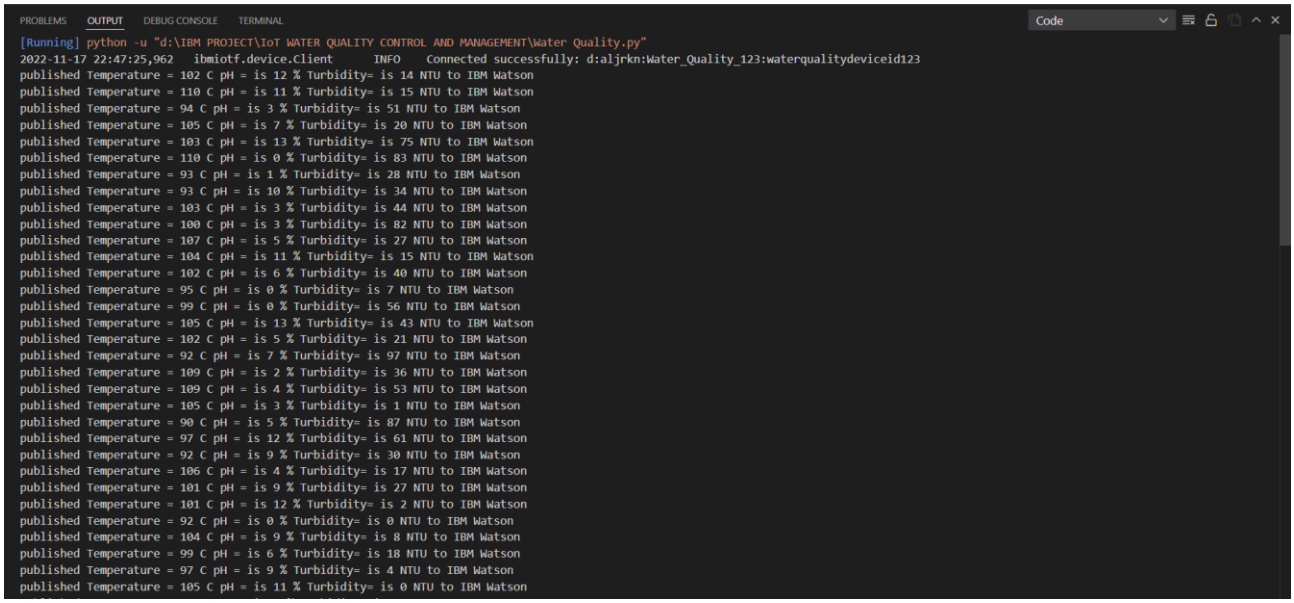
8. CODING & SOLUTIONING (Explain the features added in the project along with code)

8.1 Feature 1 (Python Programming)

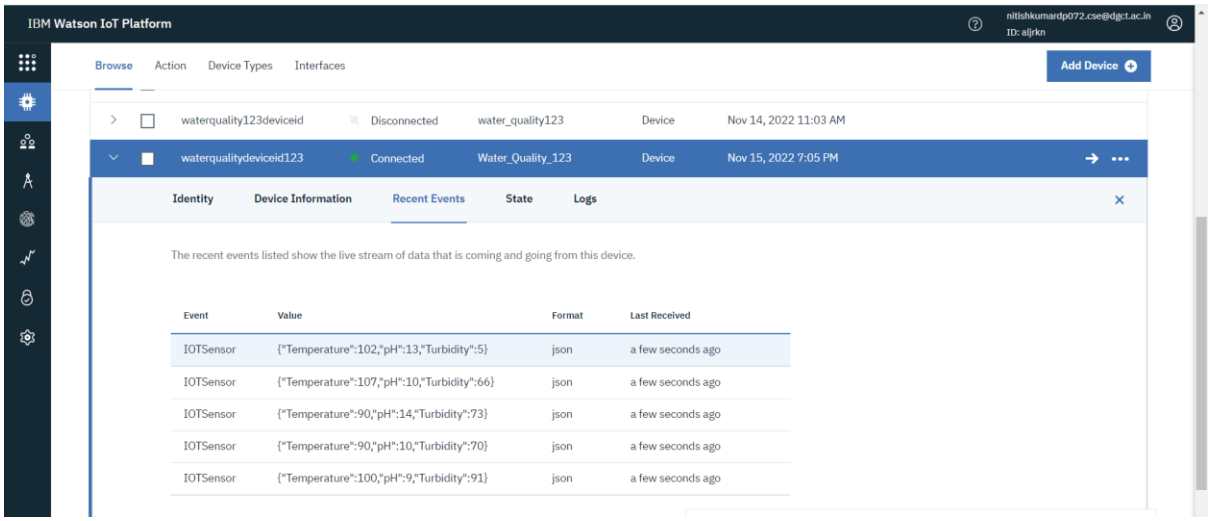
```
import time
import sys
import ibmiotf.application
import ibmiotf.device
import random

#provide Your IBM Watson Device Credentials
organization = "aljrkn"
deviceType = "Water_Quality_123"
deviceID = "waterqualitydeviceid123"
authMethod = "token"
authToken = "aiOonF6MCZ@Tke54DZ"


#Initialize GPIO
def myCommandCallback(cmd):
    print ("command received: %s" %cmd.data['command'])
    status=cmd.data['command']
    if status=="lighton":
        print  ("led is on")
    elif status == "lightoff":
       print ("led is off")
    else:
      print ("please send proper command")
try:
      deviceOptions =
{'org':organization,'type':deviceType,'id':deviceID,'auth-method':authMethod,
'auth-token': authToken}
      deviceCli = ibmiotf.device.Client(deviceOptions)
      #.............................................

except Exception as e:
       print("caught exception connecting device:%s" % str(e))
       sys.exit()

# connect and send a datapoint "hello"with value "world" info the cloud as an
event of type"greetings"10 times
deviceCli.connect()

while True:
        #Get sensor Data from DHT11
```

```
        temp=random.randint(90,110)
        pH=random.randint(0,14)
        turbidity=random.randint(0,100)

        data = { 'Temperature' : temp, 'pH': pH, 'Turbidity':turbidity }
        #print data
        def myOnPublishCallback():
            print ("published Temperature = %s C" %  temp, "pH = is %s %%" %
pH, "Turbidity= is %s NTU" % turbidity,"to IBM Watson")


        success = deviceCli.publishEvent("IOTSensor",
"json",data,qos=0,on_publish=myOnPublishCallback)
        if not success:
            print("Not connected to IOTF")
        time.sleep(10)


        deviceCli.commandCallback = myCommandCallback

# Disconnect the device and application from the cloud
deviceCli.disconnect()
```

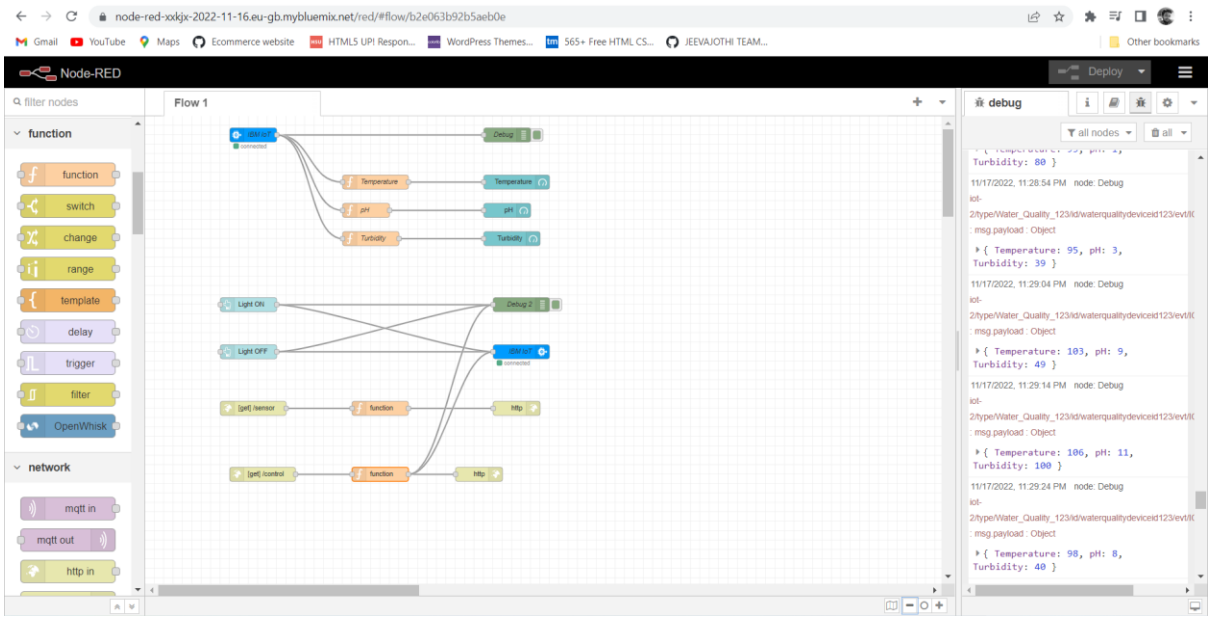
Output:

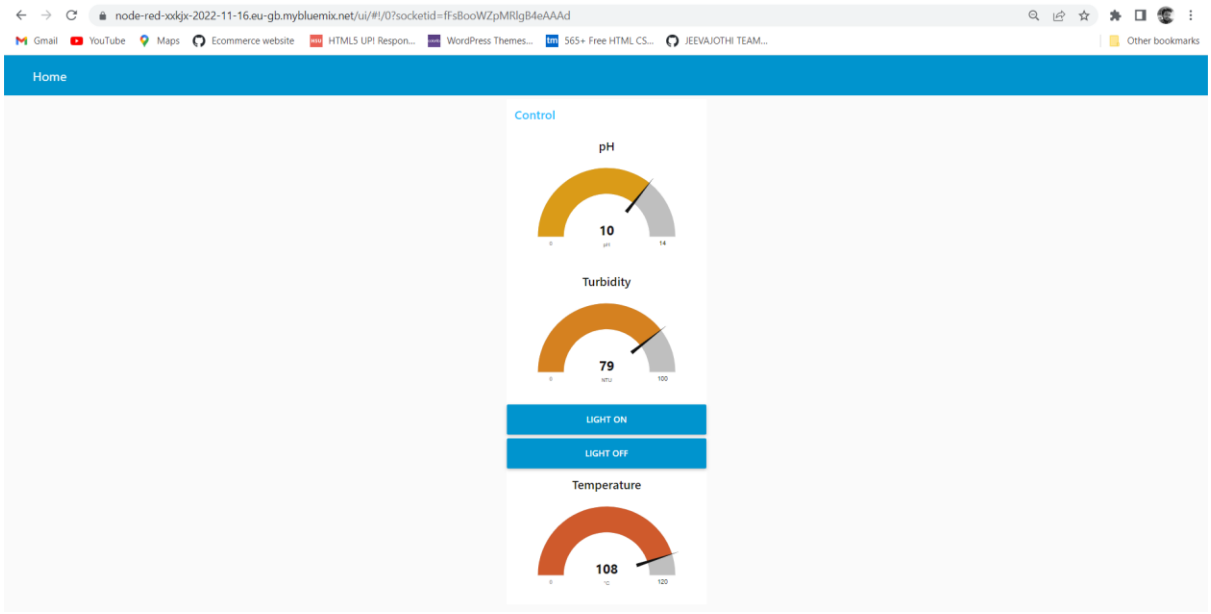


8.2 Feature 2 (IBM Watson IoT Platform Published data)

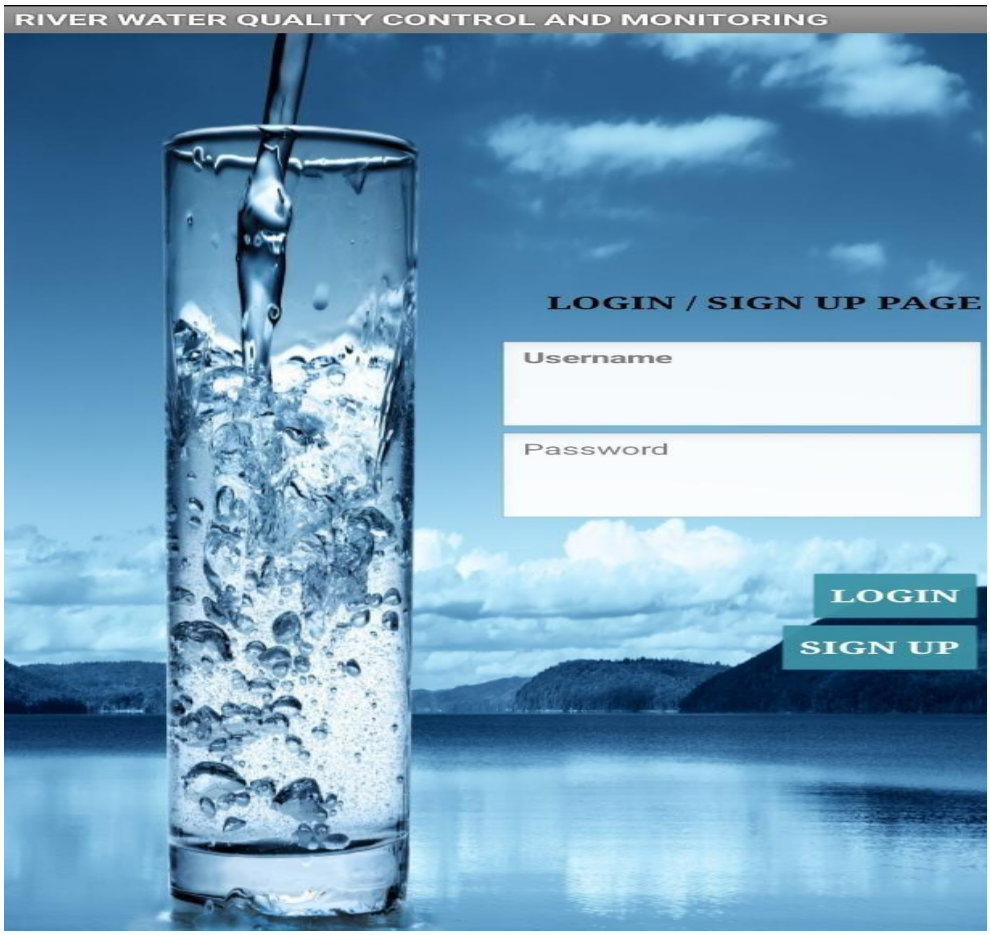


8.3 Node Red Flow

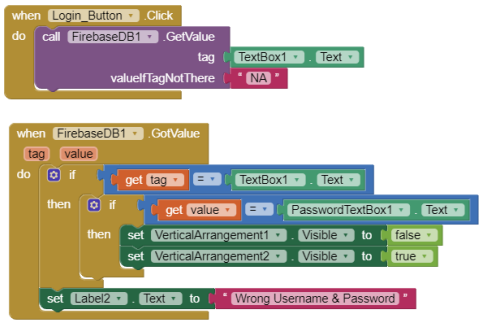


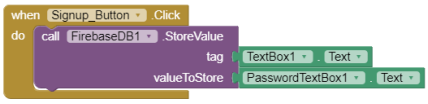


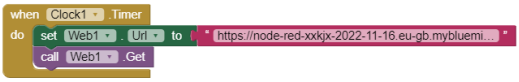
8.4 Mobile App UI

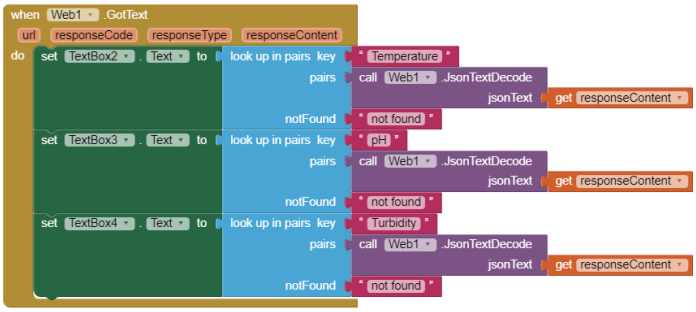


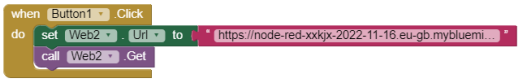
8.5 Mobile App Code Blocks:

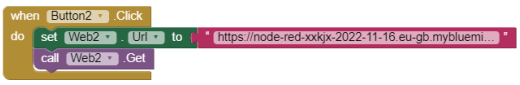












9. Testing

9.1 Test Cases:

Section	Total caes	**Not Tested**	Fail	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 4 Output		0	0	4
Version Control 3		0	0	3

9.2 User Acceptance Testing:

Purpose of this Document:

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

Defect Analysis:

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

Resolution	Severity1	Severity2	Severity3	Severity4	Sub total
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

10. Results:

In Figure (a), we are displaying the resulting sensed pH, temp, turbidity, and ORP values.

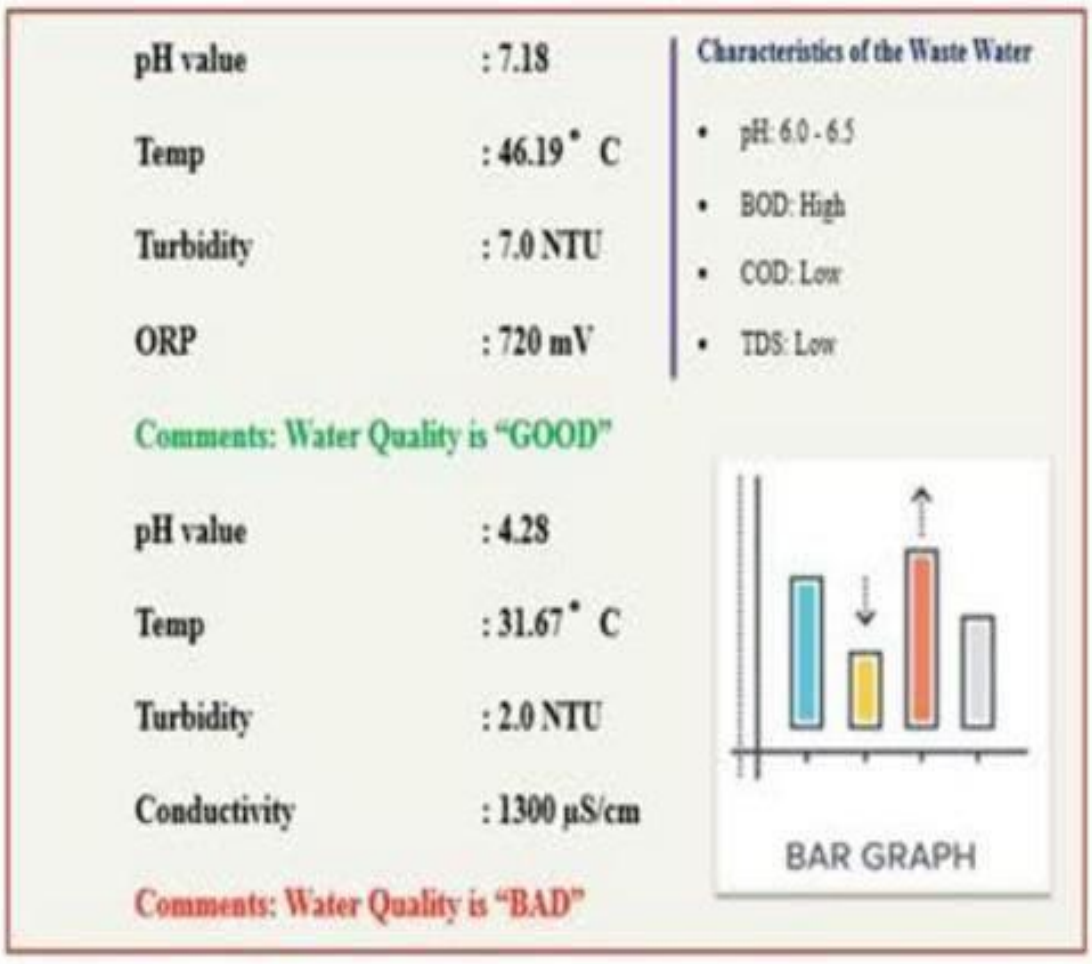
It continuously senses the values of pH, temp, turbidity, and ORP and the resulting values aredisplayed to the LCD, PC or mobile in real-time.

If the acquired value is above the threshold value comments will be displayed as ‘BAD’.

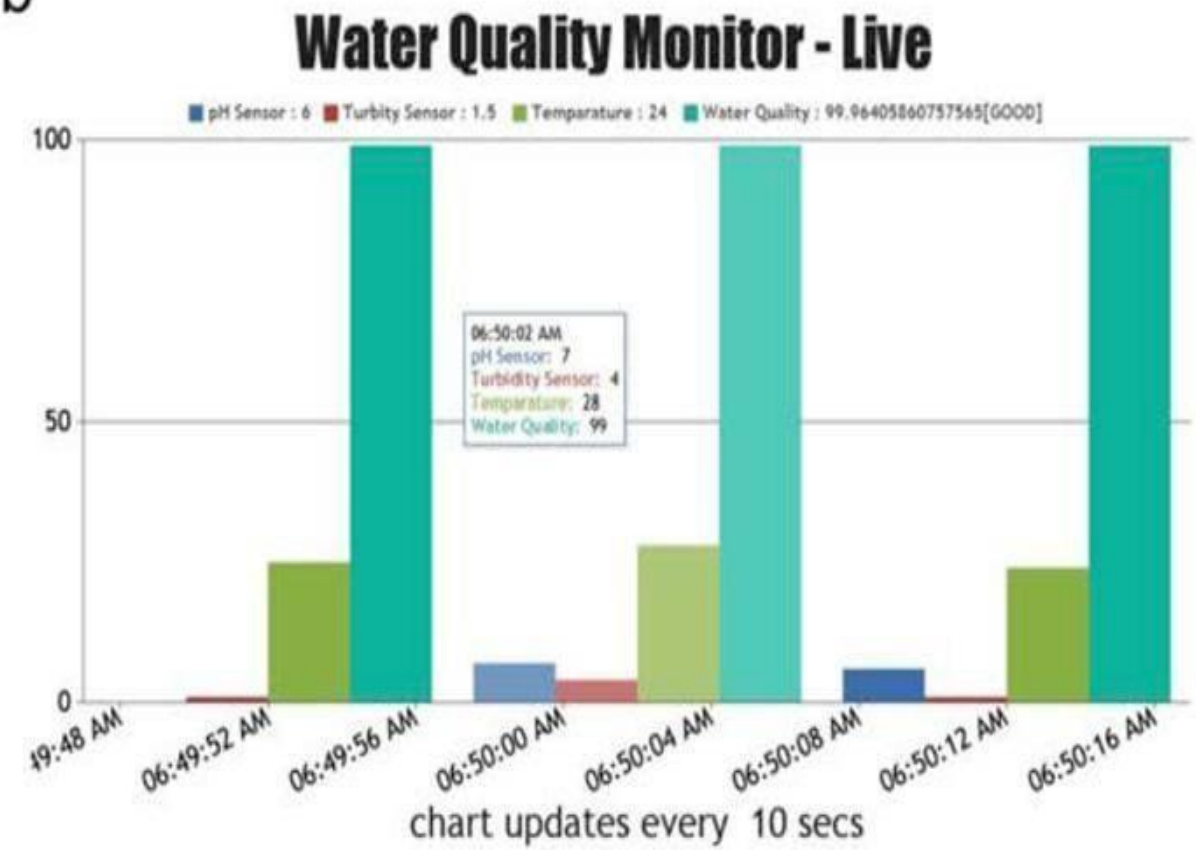
If the acquired value is lower than the threshold value comments will be displayed as ‘GOOD’.

A bar/line graph will also be shown for perfect understanding. The time series representation ofsensor data with decision is shown in Figure (b).

a



b



11. Performance Metrics:

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

Performance Table:

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

12. 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 ofplc with Arduino and Bluetooth module allows remote controlling of the system.

1. Due to automation it will reduce the time to check the parameters.

2. This is economically affordable for comman people.

3. Provides the prevention from diseases caused by water.

4. Accuracy in measurement 5. SMS alert is sent to the user.

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 do not reflect realtime water quality measurement due to delay in measurement.

- The process is time consuming due to slow process of manual data collection from differentlocations of the water body.

- The method is prone to human errors of various forms.

13. Conclusion:

This presents a detailed survey on the tools and techniques employed in existing smart water quality monitoring systems. Also, a low cost, less complex water quality monitoring system is proposed. The implementation enables sensor to provide online data to consumers. The proposed setup can be improved by incorporating algorithms for anomaly detection in water quality. So, this proposed system will surely helpful to the society for safe supply of water. Real-time monitoring of water quality by using IoT integrated Big Data Analytics will immensely help people to become conscious against using contaminated water as well as to stop polluting the water.

The research is conducted focusing on monitoring river water quality in real-time. Therefore, IoTintegrated big data analytics is appeared to be a better solution as reliability, scalability, speed, and persistence can be provided. During the project development phase an intense comparative analysis of real-time analytics technologies such as Spark streaming analysis through Spark MLlib, Deep learning neural network models, and Belief Rule Based (BRB) system will be conducted[20- 27].

This research would recommend conducting systematic experimentation of the proposed technologies in diverse qualities of river water in Bangladesh. Due to the limitation of the budget,we only focus on measuring the quality of river water parameters. This project can be extended into an efficient water management system of a local area. Moreover, other parameters which wasn't the scope of this project such as total dissolved solid, chemical oxygen demand and dissolved oxygen can also be quantified. So the additional budget is required for further improvement of the overall system.

14. 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 ofpollution in water. who are living in rural areas near to the river will be very satisfied with our idea. It will be usefulto monitor water pollution in specific area. So, this system prevents 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 creating a social satisfaction for farmers too. The scalability ofthis project gives the addition of more different type of sensors. By interfacing the relay we cancontrol the supply of water. We can also implement as a revenue model.
This system could also be 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.
Author contributions

This work was carried out in collaboration between all authors. All the authors have accepted responsibility for the entire content of this submitted manuscript and approved the submission. MSUC, TBE, SG, AP, MMA, NA, and MSH carried out the study design, performed the experiments, data collection, data interpretation, and statistical analysis.

Authors MSUC, TBE, and AP collected the water samples. Authors SG and AP has arranged thesoftware simulation study. Authors TBE and MSH has arranged the biological study.

MSUC, TBE, SG, AP, and MSH designed and planned the studies, supervised the experiments. MSH also acted for all correspondences.

MSUC, TBE, SG, AP, MMA, NA, and MSH participated in the manuscript draft and has thoroughly checked and revised the manuscript for necessary changes in format, grammar and English standard. KA checked the format, grammar and revised the manuscript. All authors readand agreed the final version of the manuscript.

Git Hub Link:

https://github.com/IBM-EPBL/IBM-Project-36736-1660297415