1.INTRODUCTION

1.1 PROJECT OVERVIEW

There are five main components of the environment: soil, water, climate, native plants, and landforms. The most important of these for human life is water. Additionally, it is essential for the survival of other living environments . Water that is safe and easily accessible is essential for maintaining public health, whether it is utilised for drinking, residential uses, food production, or recreational activities . Therefore, it is crucial for us to keep the balance of water quality. Otherwise, it would seriously jeopardise human health and disrupt the ecological balance of other species .

1.2 PURPOSE

We outline the Wireless Sensor Network (WSN) concept, which uses data collected by sensors submerged in water to help monitor water quality. This system can measure a number of properties in water, including pH, dissolved oxygen, turbidity, conductivity, temperature, and others, using a variety of sensors. Real-time data capture, transmission, and processing now have a fresh method thanks to the quick development of WSN technology. Customers can access up-to-date information on water quality from a distance.

2.LITERATURE SURVEY

2.1 EXISTING PROBLEM

River Water Quality Monitoring for Rural Areas-A Sensor Cloud Based Economical Project by Nikhil Kedia. Printed at the 2015 Dehradun, India, First International Conference on Next Generation Computing Technologies (NGCT-2015)[1]. Jayti Bhatt,Jignesh Patoliya entitled “Real Time Water Quality Monitoring System”.This paper describes to ensure the safe supply of drinking water the quality should be monitored in real time for that purpose new approach IOT (Internet of Things) based water quality monitoring has been proposed[2]. Michal Lom, Ondrej Pribyl, Miroslav Svitek entitled “Industry 4.0 as a Part of Smart Cities”. This paper describes the conjunction of the Smart City Initiative and the concept of Industry

4.0. The term smart city has been a phenomenon of the last years, which is very inflected especially since 2008 when the world was hit by the financial crisis.[3]

2.2 REFERENCES

[1] Nikhil Media, Water Quality Monitoring for Rural Areas- A Sensor Cloud Based Economical Project, in 1st International Conference on Next Generation Computing Technologies (NGCT-2015) Dehradun, India, 4-5 September 2015. 978-1-4673-6809-4/15/$31.00 ©2015 IEEE

[2] Jay Bhatt, Jignesh Patoliya, IoT Based Water Quality Monitoring System, IRFIC, 21feb,2016.

[3] Chemical lom, ondrej priby & miroslav svitek, Internet 4.0 as a part of smart cities, 978-1-5090-1116-2/16/$31.00 ©2016 IEEE

2.3 PROBLEM STATEMENT DEFINITION

I am	Common people living a normal life on Earth	Common people living on Earth who consume water in their day-to-day life for different purpose
I'm trying to	Monitor the quality of the water	Wants to monitor the water consumed everyday whether the water is contaminated or pure, pH, temperature, salinity in it

but	Do not know to monitor the quality of water	Time consuming process for manual testing
because	Lack of required knowledge	Common people lack knowledge of this type of testing, sensors etc.
Which makes me feel	Doubted and fearful of the consumed water	Decline of pure water, increasing viral diseases

3.IDEATION AND PROPOSED SOLUTION

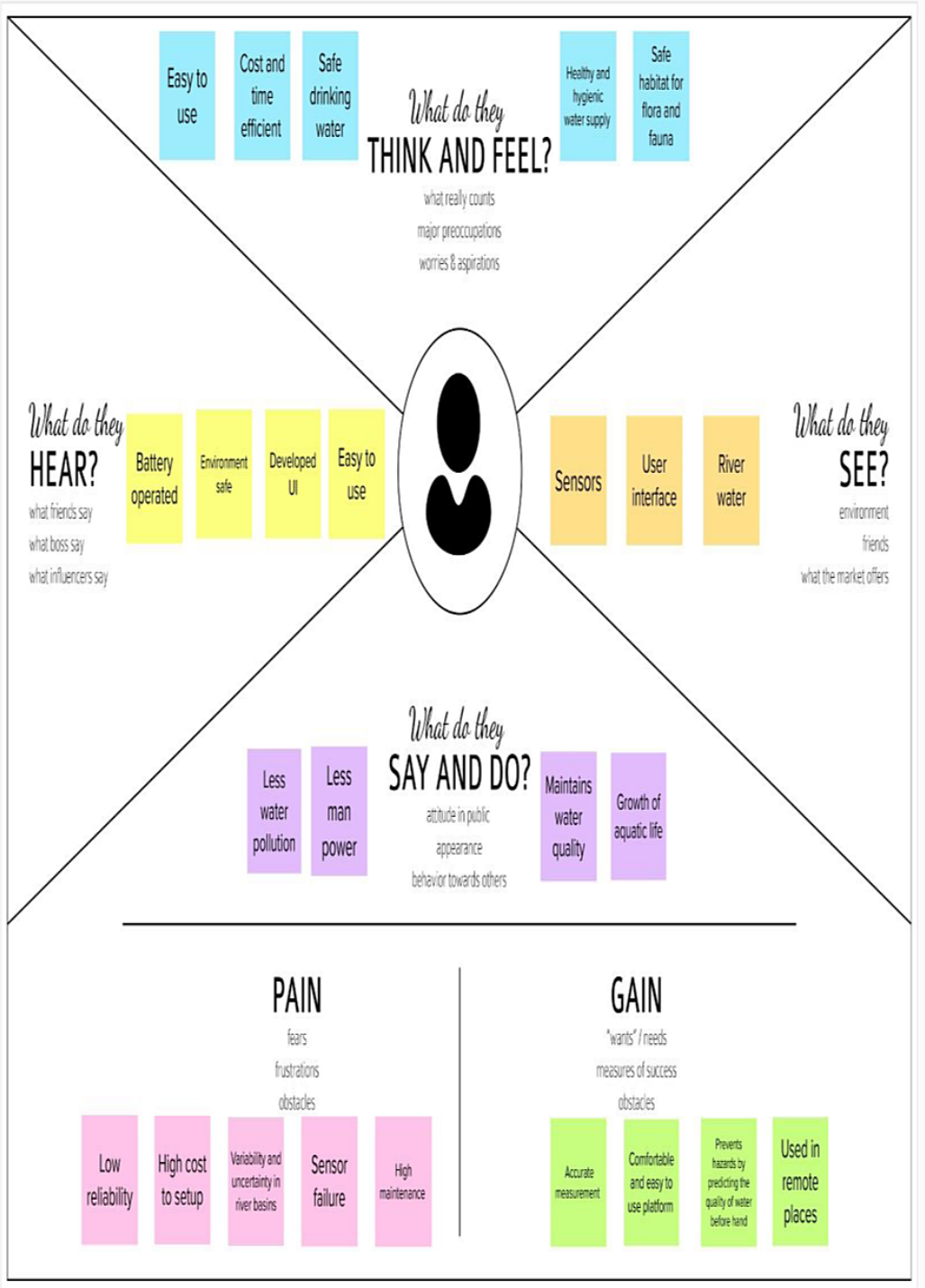
Project team shall fill the following information in proposed solution template

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	IOT Based Real Time River Water Quality Monitoring and Control System
2.	Idea / Solution description	1. To monitor the quality of water using sensors like temperature, potentiometer(pH), turbidity, salinity and so on. 2. Collecting those data and storing it in cloud and perform analyse to check if the water is contaminated or not for drinking. 3. If the water is contaminated an alert is made

		to the user/ local authority through SMS or can be viewed through web application anytime.
3.	Novelty / Uniqueness	1.Based on the collected data prediction is made whether the water can be used for cultivation of specific crops and suitable for the aquatic animals.
4.	Social Impact / Customer Satisfaction	Algal growth, fertilizers, pesticides cause river pollution which can impact all living beings. Better monitoring and control measures can impact health and vegetation massively.
5.	Business Model (Revenue Model)	Service based product is developed to serve the local people to know the quality of water before consuming it or using it for any purpose. This prevents health issues or at most loss of living being.

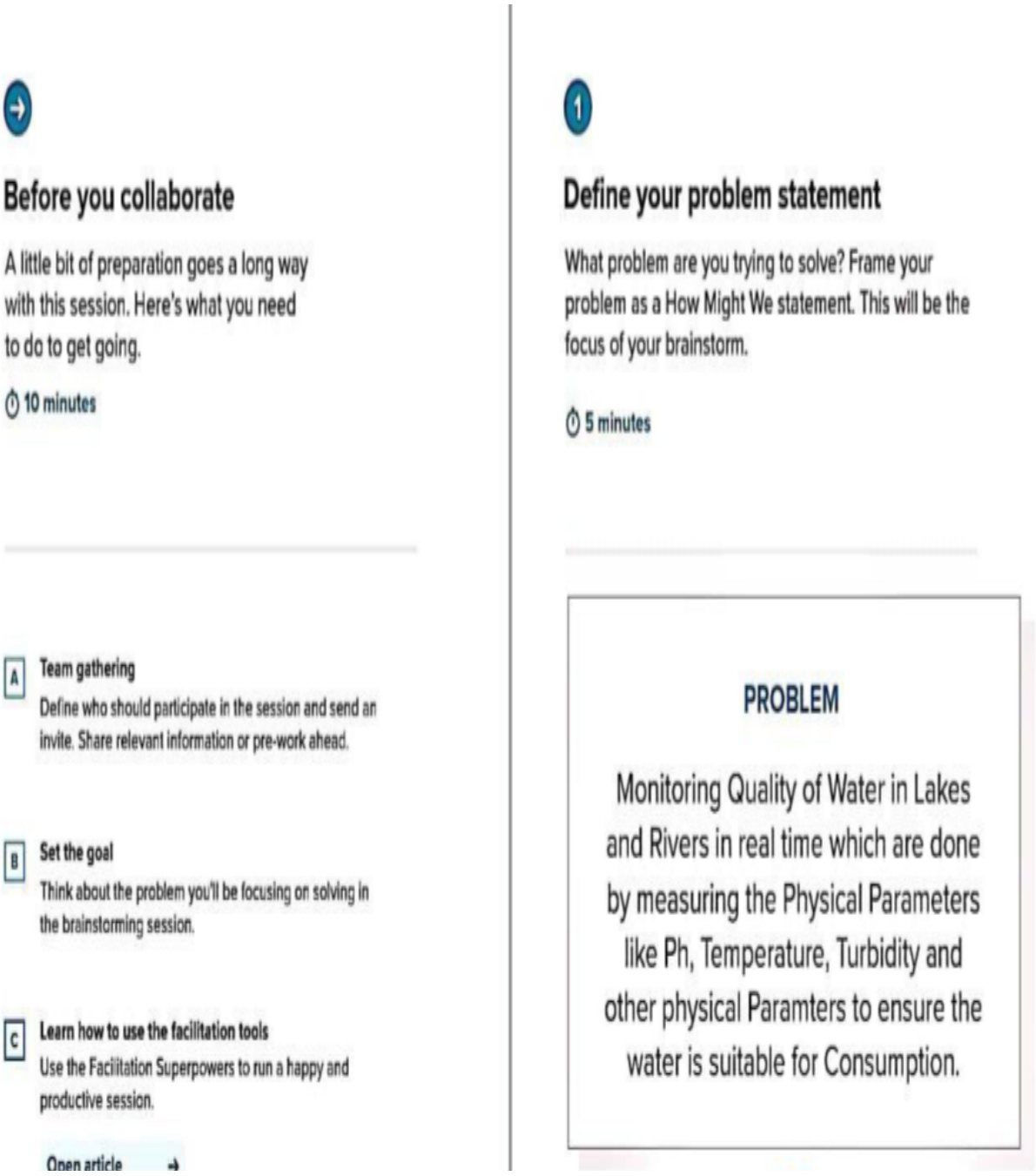
6.	Scalability of the Solution	Developing the product as both web and mobile application it is portable, and data can be accessed from anywhere anytime. provide a real-time monitoring and a feasible solution for remote or distant places where water quality laboratory is not present.

3.1 EMPATHY MAP CANVAS



3.2 IDEATION AND BRAINSTORMING

Step-1: Team Gathering, Collaboration and Select the Problem Statement



Step-2: Brainstorm, Idea Listing and Grouping

2

Brainstorm

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

10 minutes

PREMASAI

- Also can Make Use of this Device in Closed Places
- More Internet Speed Can Access The Device Anywhere
- It does not cause any Radiation effect.
- The device must be visible .
- Proper Service & Maintenance not required

MOHANRAM

- Protectors are needed for sensors.
- pH sensor , Flow sensor , Temperature , COD sensor can be used .
- Variable analysis can be taken for more accuracy
- During natural calamities , sensors could be damaged . protectors prevent those damages.
- Total Dissolved Solids can be measured using TDS meter .

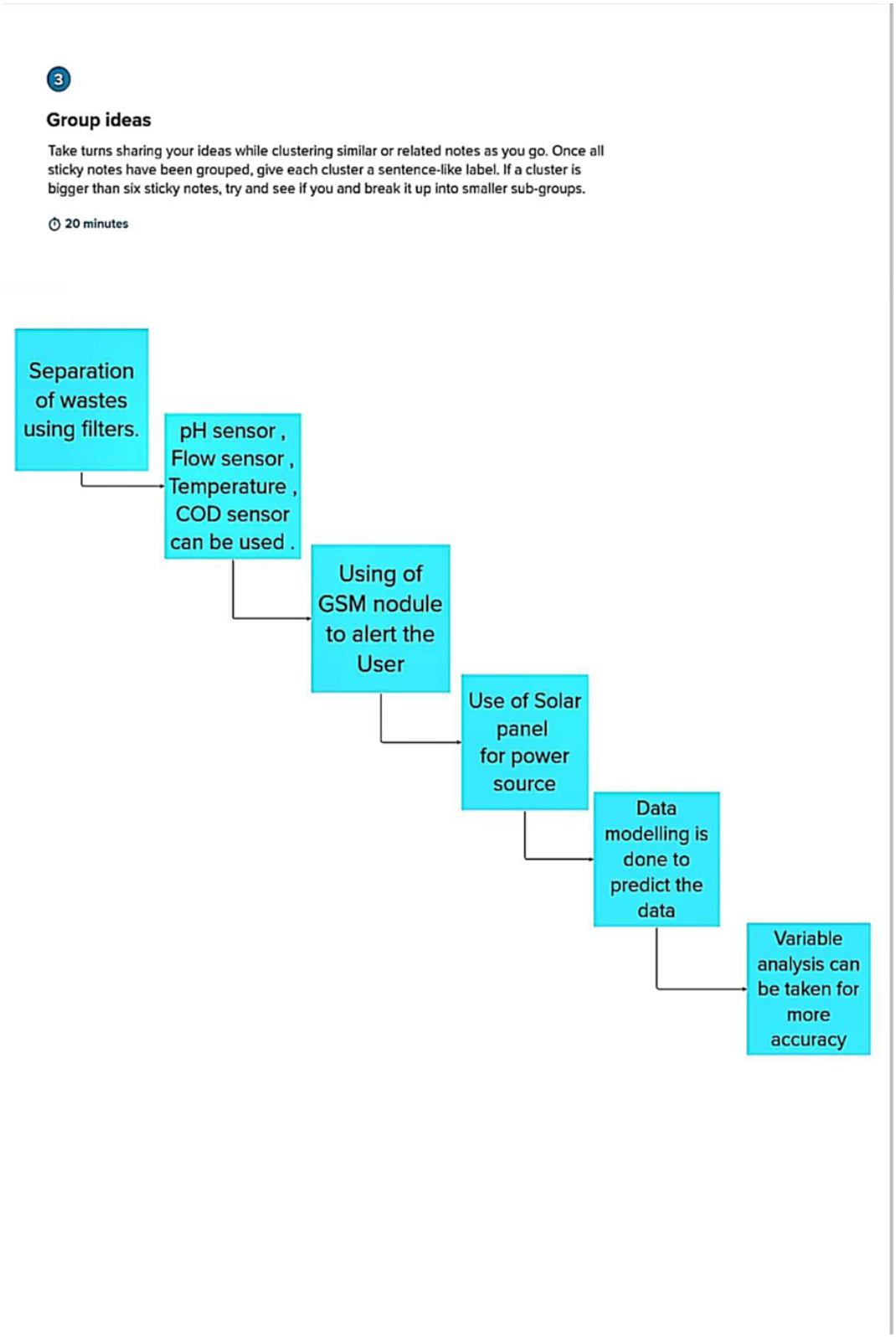
PRATEEK

- Separation of wastes using filters.
- Using minimum number of parameters
- Prediction can be done based on previous data
- Using of GSM nodule to alert the User
- Using an alarm to alert the user

DEEPAK

- Data modelling is done to predict the data
- Statistical values of ph meter temperature and turbidity sensor values are stored
- Components needs to be well protected from Solar and water Damages
- Use of Solar panel for power source
- Threshold values of sensors are pre-built

Step-3: GROUP Ideas:



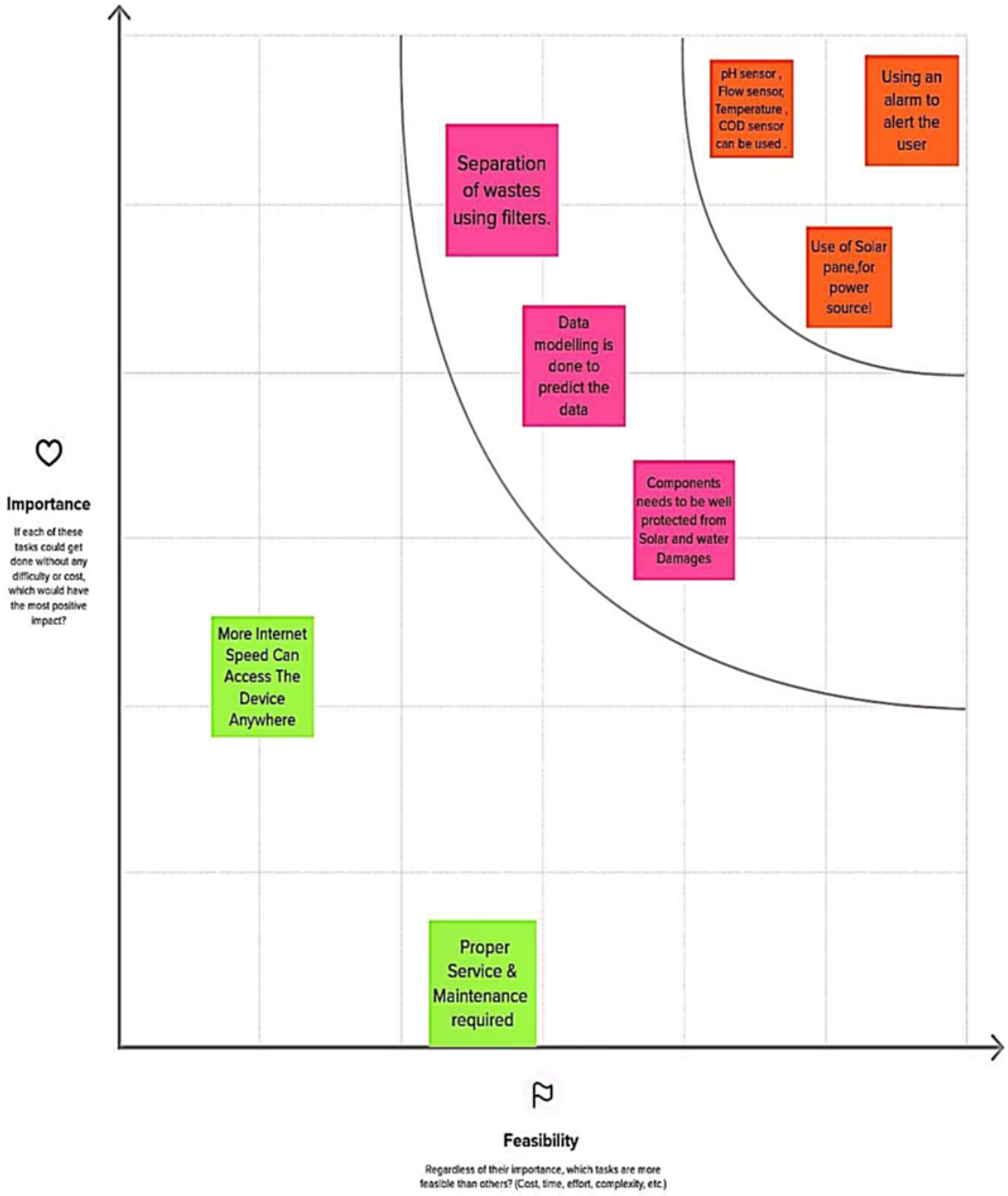
Step-4: Idea Prioritization

4

Prioritize

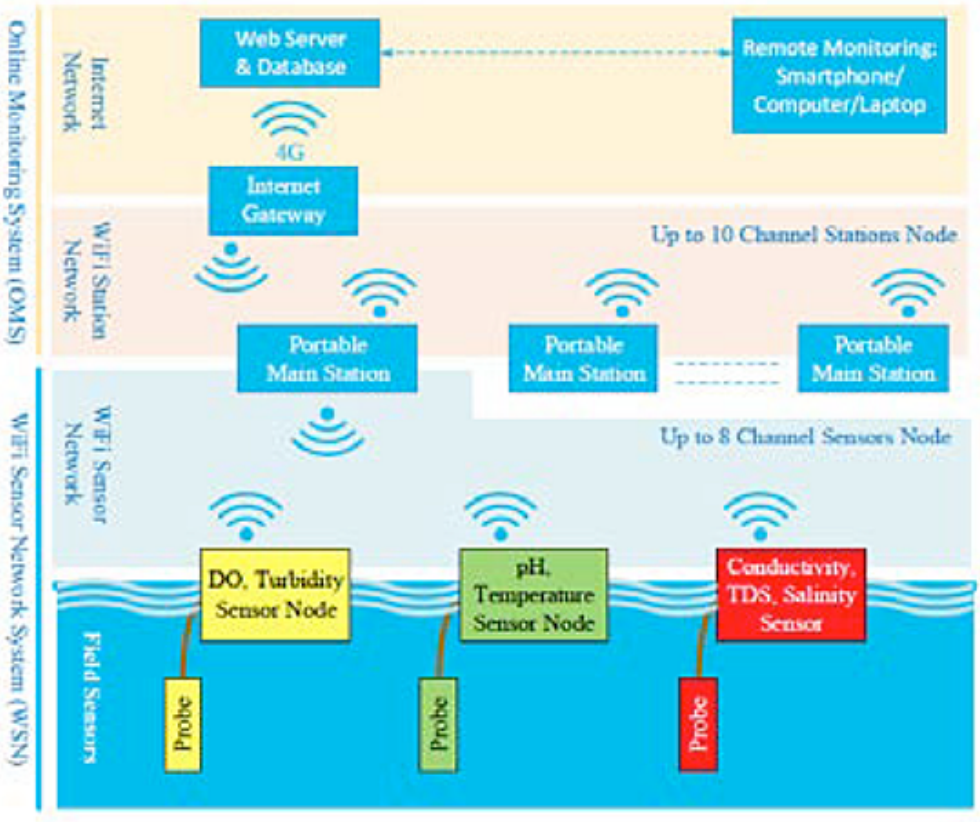
Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

20 minutes



3.3 PROPOSED SOLUTION

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 analysed 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. The detailed scheme of a water quality monitoring system



PROBLEM SOLUTION FIT

1. CUSTOMER SEGMENT(S)

Local Authorities and Common people

CS 6. CUSTOMER LIMITATIONS

CL 5. AVAILABLE SOLUTIONS PLUSES & MINUSES AS

Local Authorities and Common people

2. PROBLEMS / PAINS + ITS FREQUENCY PR

Consuming contaminated water leads to various problems for all living organisms. Costly, do not know if accurate, not available for all localities.

3. PROBLEM ROOT / CAUSE RC

The water may be contaminated by means of nutrient pollution (Industry), Eutrophication, Algal blooms and so on.

Accurate measuring of water quality using various sensors, make it available in all remote places

7. BEHAVIOR + ITS INTENSITY BE

If there is even a small change in water's parameter, then there is said to be some sort of contamination in water, so the sensors should be capable to analyse that small change and should predict it accurately.

4. EMOTIONS BEFORE / AFTER

The output is predicted accurately regarding the contamination of water, so as to avoid consumption of contaminated water by the people

TR

EM

Here the motive is to predict the contamination of river water and create awareness among people for the same.

5. YOUR SOLUTION SL

The water should be monitored by using sensors and gather its temperature, Ph value, Turbidity value should be measured so that the user(Who consumes the water) be aware of the water he/she consumes and prevents consuming when the water is contaminated.

6. CHANNELS of BEHAVIOR CH

ONLINE

Customer uses web application to analyse various parameters of water.

OFFLINE

The customer receive message in mobile phone if there is any change(Contamination) in water.

4.REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENT

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Login	Confirmation through verified password
FR-2	View Water Details	View current water details in website View traditional water eligibility in website
FR-3	Logout	Logs out the user successfully

4.2 NON-FUNCTIONAL REQUIREMENT

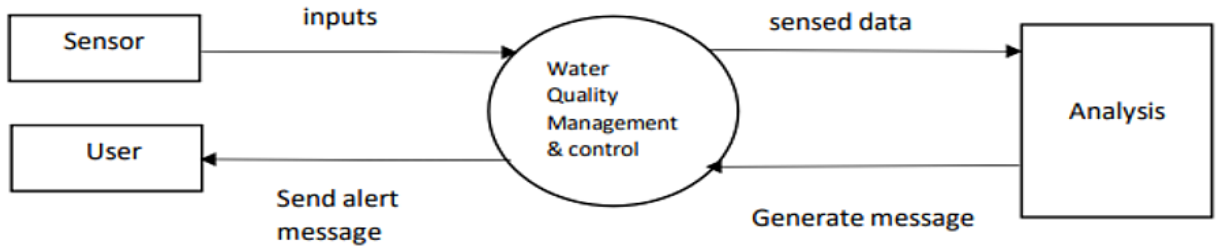
Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Load time for user interface screens shall not be more than 2 seconds.
NFR-2	**Security**	User account is password protected Account creation done only after email verification
NFR-3	**Reliability**	Users can access their account 98% of the time without failure
NFR-4	**Performance**	Load time for user interface screens shall not be more than 2 seconds. Login info verified within 10 seconds.
NFR-5	**Availability**	Maximum down time will be about 4 hours
NFR-6	**Scalability**	System can handle about 1000 users at any given time

5.PROJECT DESIGN

5.1 DATA FLOW DIAGRAMS

DFD:

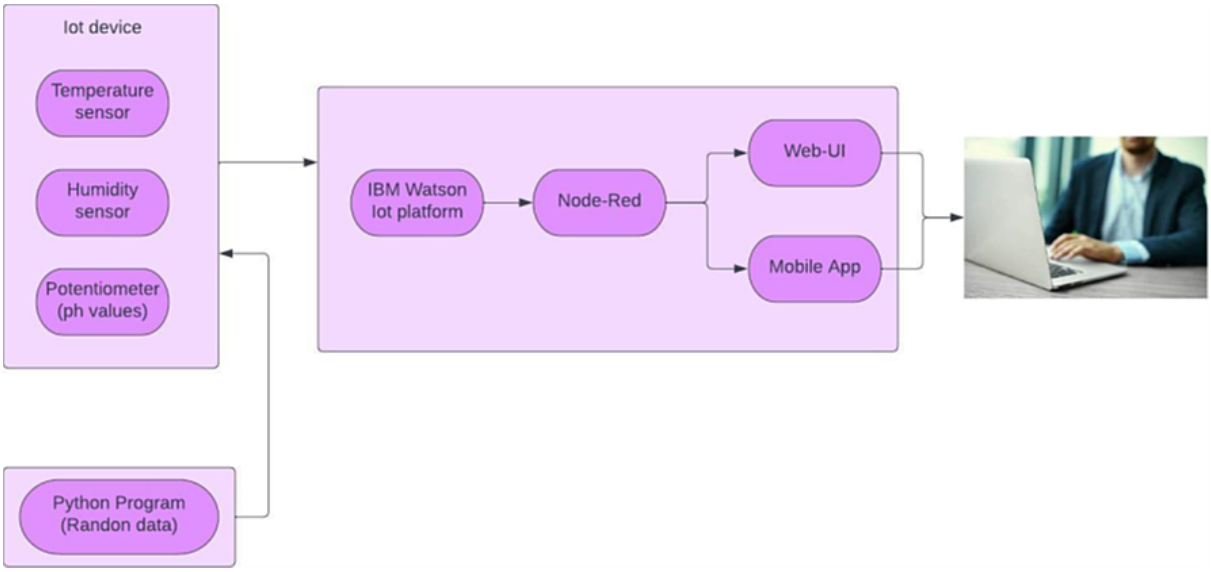


User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
User(Mobile user)	Check Notification	USN-1	User can check the notification of the alert message.	User can check the notification	High	Sprint-1

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
	Check water parameters	USN-2	User can check the level of water parameters like temperature, humidity, PH level etc.	User can check the level of water parameters	High	Sprint-1

5.2 SOLUTION AND TECHNICAL ARCHITECTURE

Solution Architecture Diagram:



6.PROJECT PLANNING AND SHEDULING

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Check Notification	USN-1	As a user, I can check the notification of the alert message.	20	High	Kanish kumar S, Aakash B,
Sprint-2	Check water parameters	USN-2	As a user, I can check the level of water parameters like temperature, humidity, PH level etc.	20	High	Chandraruban Muthukumar, A P Dharineeshh

Project Tracker, Velocity & Burn-down Chart:

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

Velocity:

Sprint 1: 1 user story x 20 story points = 20

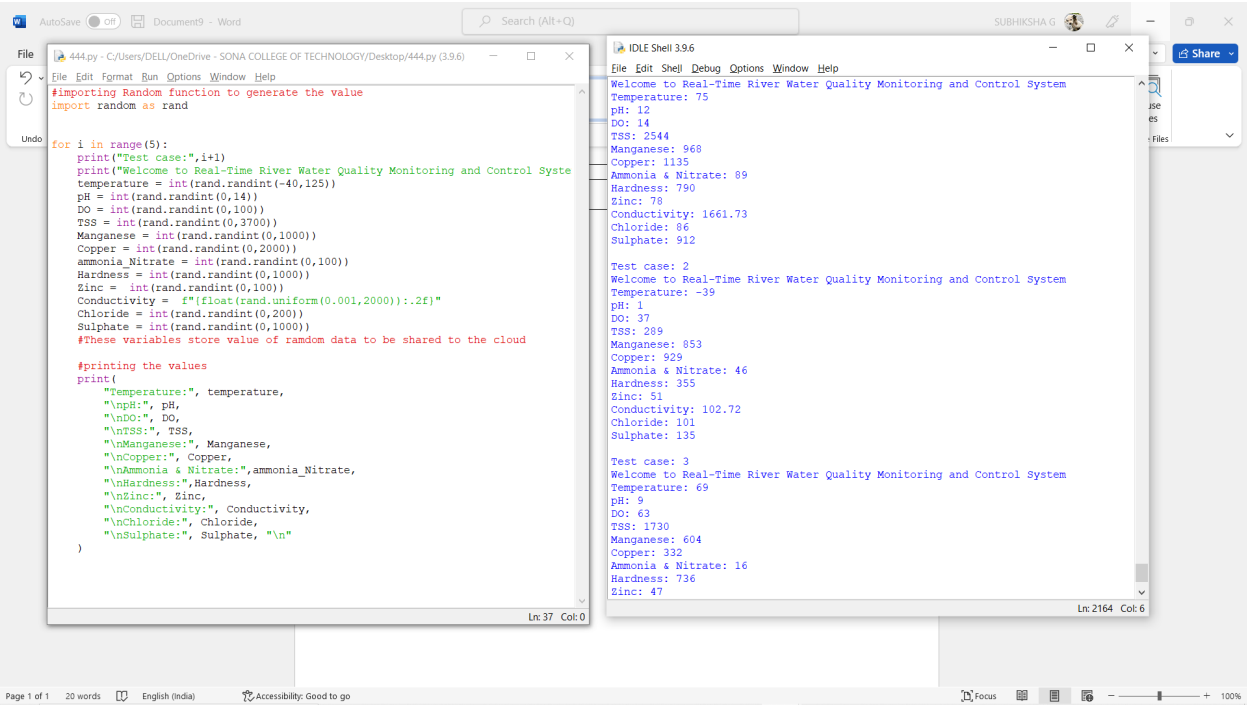
Sprint 2: 1 user story x 20 story points = 20

Total = 40 Average Sprint Velocity = 40 / 2 = 20

7.CODING

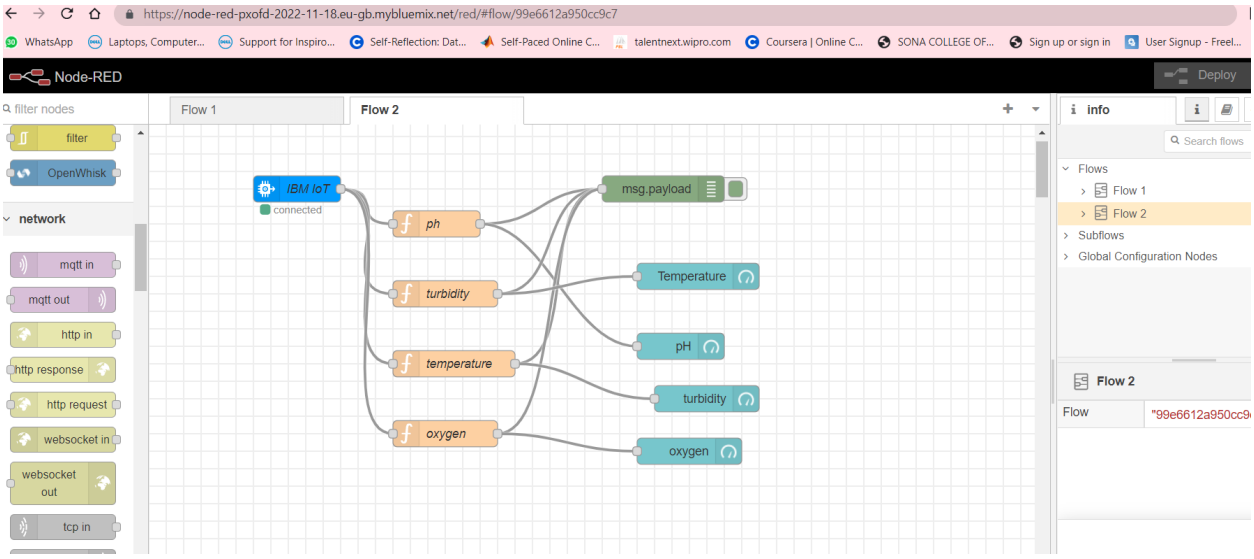
7.1 FEATURE 1

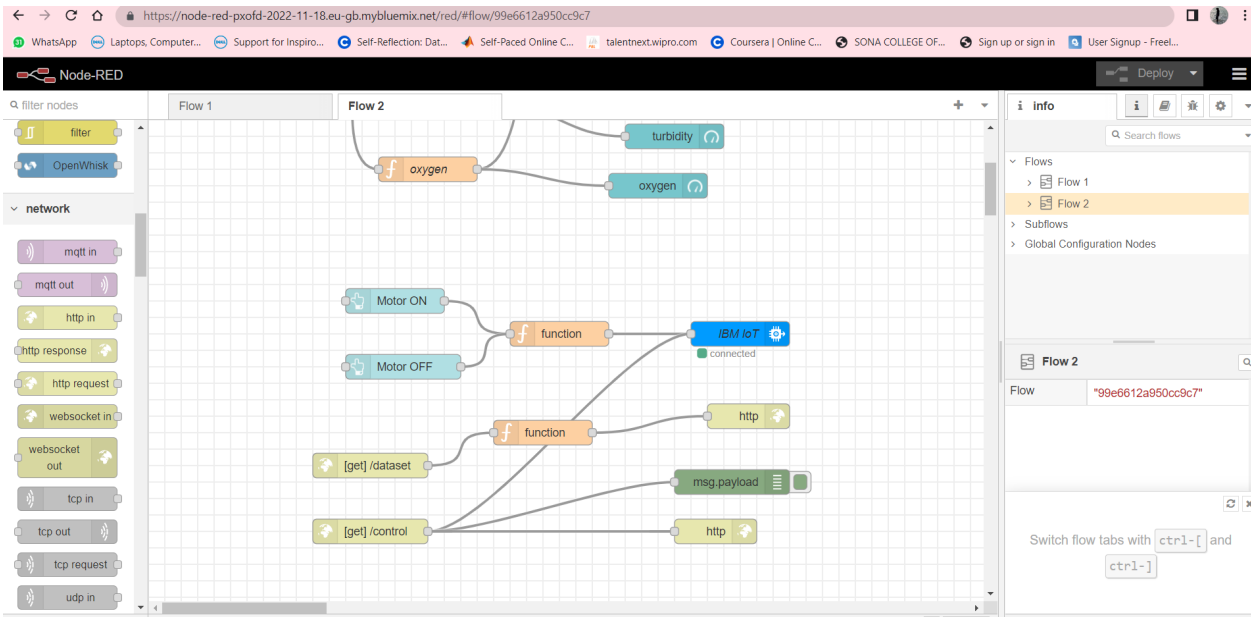
The proposed system has coding part in which the coding is been done using Python IDE and the python code is been connected to UI as well as Watson IOT cloud platform.



7.2 FEATURE 2

The following diagram shows the circuit connection made for the proposed system using UI.The sensors are connected as per the proposed system requirements and the python code is been compiled and the simulation is done.

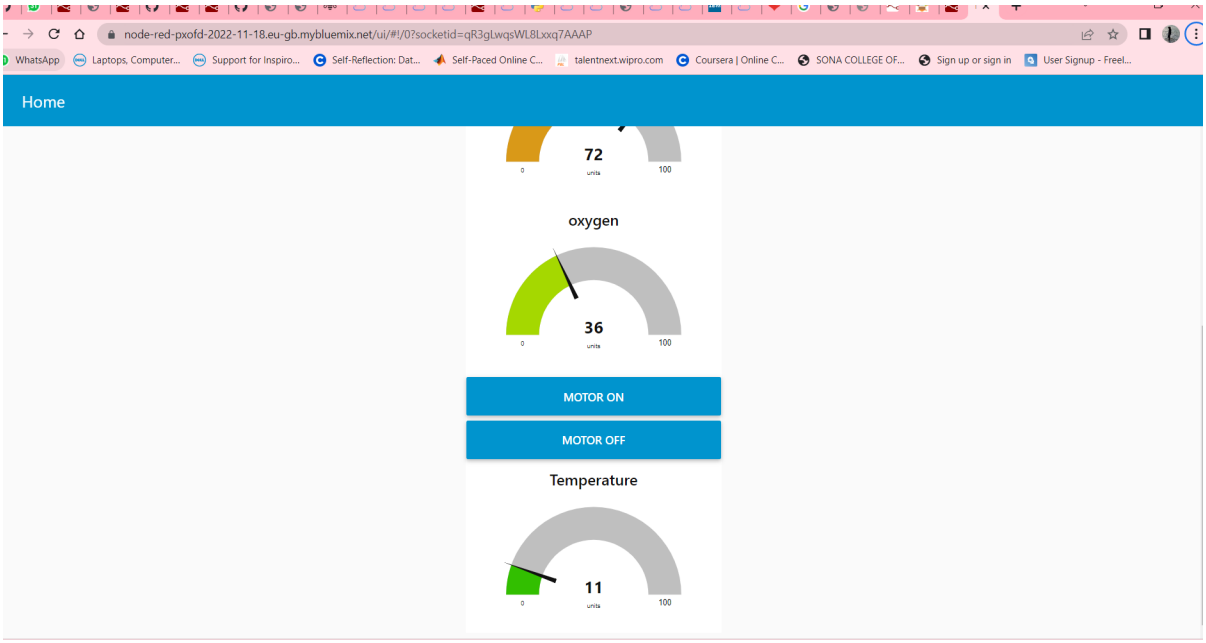


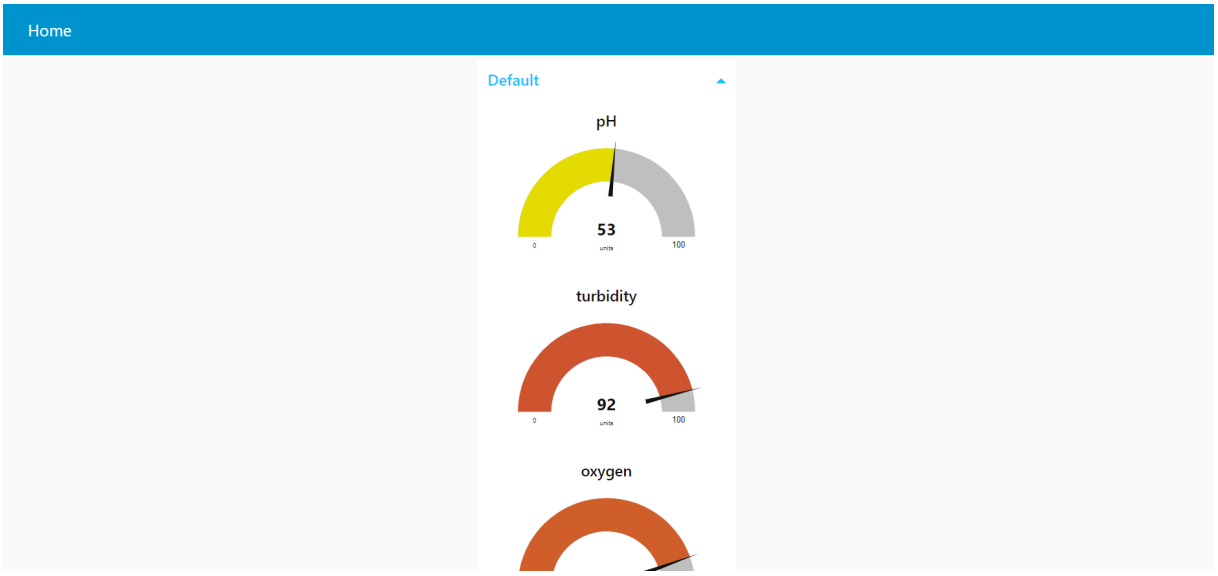


8.RESULT

The sensors are connected as per the proposed system requirements and the python code is been compiled and the simulation is done. The simulation is been recorded and attached to the drive file . The system functioning and the values of temperature,humidity,oxygen,turbidity and pH level of the water is viewed in the proposed system output.

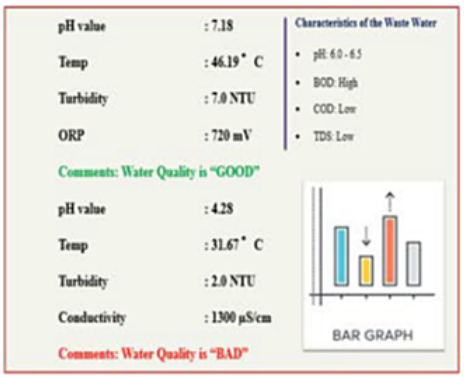
https://drive.google.com/file/d/1vttlnqZEqKmG5WFKlsy2febovygUWkJA/view?usp=sharing



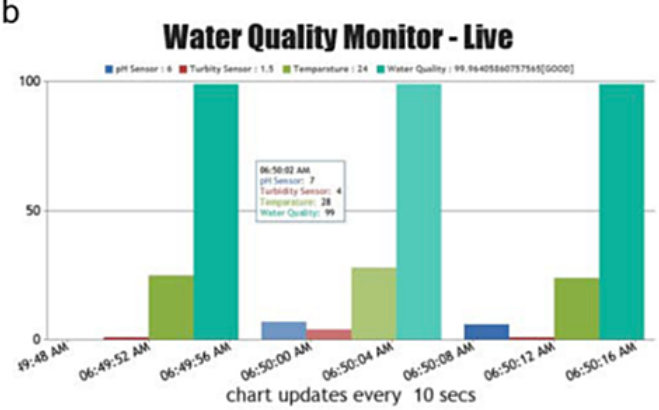


9.1 PERFORMANCE METRICS

a



b



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 are displayed 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 of sensor data with decision is shown in Figure

The figure displays the resulting sensed pH, temp, turbidity, and ORP values. It continuously senses the values of pH, temp, turbidity, and ORP and the resulting values are displayed 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. (b) The time series representation of sensor data with decision.

10.ADVANTAGES

- It is very easy to maintain the IoT based water quality monitoring system as all the electronic boards are available in the boat itself.

- The system is very cheap as the hardware and software does not cost much.
- Enchance's the efficiency of water systems.
- Simple compact and was to use.

11.CONCLUTION

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, IoT integrated 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 . 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.

12.FUTURE SCOPE

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 hydro logic, 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.