

**NANDHA ENGINEERING
COLLEGE
(Autonomous)**

PROJECT

**REAL-TIME RIVER WATER QUALITY
MONITORING AND CONTROL SYSTEM.**

DONE BY:-

TEAM ID: PNT2022TMID19722

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1. INTRODUCTION

a. Project Overview

Project is real-time river water quality monitoring and control system is about we do have so many low laying pits and the big pits are called canals and flow of water is called rivers .now a days most of the rivers are filled with dirty water and in some places we can not able to draw the water and we can not make use of the ground water because in our country or in the worlds there are place where any body can not able to make use of the ground water .there are people who only depend on the stream of water that flowing there near by simply rivers .such that river water plays an crucial role in so many life's.not only human beings but also other animals and living things that are living inside the water ,so there is in need of using the good and efficient water .normally the purity of water is depend up on or the drinking water is safe is determined not only on impurities present in the water but also one thing is ph lever the ph level of the water should be 7 that is neutral state so we are using this project to control the river water ph level with the help of IOT. 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 microcontroller 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 apart site can be displayed in a visual format on a server PC with the help of Spark streaming analysis through Spark MLlib, Deep learning neural network models, Belief Rule Based (BRB) system and is also compared with standard values. If the acquired value is above the threshold value automated warning SMS alert will be sent to the agent. The uniqueness of our proposed paper is to obtain the water monitoring system with high frequency, high mobility, and low powered. Therefore, our proposed system will immensely help Bangladeshi populations to become conscious against contaminated water as well as to stop polluting the water.

b. Purpose

In this project, we depict the design of Wireless Sensor Network (WSN) [4-7] that assists to monitor the quality of water with the support of information sensed by the sensors dipped in water. Using different sensors, this system can collect various parameters from water, such as pH, dissolved oxygen, turbidity, conductivity, temperature, and so on. The rapid development of WSN technology provides a novel approach to real-time data acquisition, transmission, and processing. The clients can get ongoing water quality information from far away. Now a day's Internet of things (IoT) is an innovative technological phenomenon. It is shaping today's world and is used

in different fields for collecting, monitoring and analysis of data from remote locations. IoT integrated network is everywhere starting from smart cities, smart power grids, and smart supply chain to smart wearable [7- 12]. Though IoT is still under applied in the field of environment it has huge potential. It can be applied to detect forest fire and early earthquake, reduce air pollution, monitor snow level, prevent landslide, and avalanche etc. Moreover, it can be implemented in the field of water quality monitoring and controlling system [4, 13]. Water quality monitoring has gained more interest among researchers in this twenty-first century. Numerous works are either done or ongoing in this topic focusing on various aspects of it. The key theme of all the projects was to develop an efficient, cost-effective, real-time water quality monitoring system which will integrate wireless sensor network and internet of things [14]. In this research, we monitor the physical and chemical parameters of water bodies inside Chittagong city by using an IoT based sensor network.

LITERATURE SURVEY

a. Existing problem

Nowadays water is the most valuable for all the human beings drinking water utilities faces challenges in real time operation. These challenges occurred because of growing population, limited water resources, ageing infrastructure etc. Hence there is a need of better methodologies for monitoring the water quality. To reduce the water related diseases and prevent water pollution World health Organization (WHO) has also stated This crisis as "the largest mass poisoning of a population in history". The main goal of this paper to build a Sensor- based Water Quality Monitoring System.

b. References

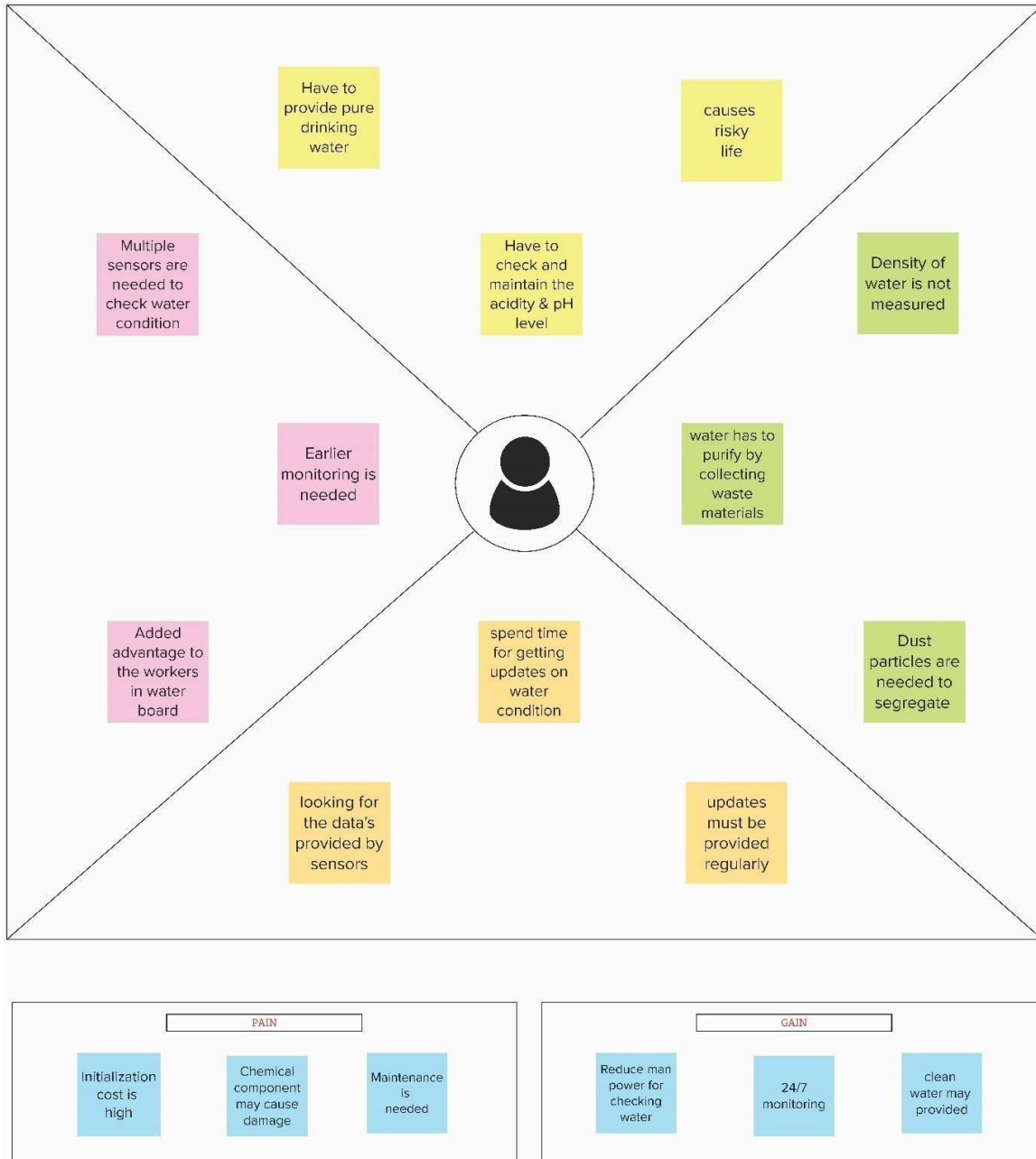
1. Real-Time River Water Quality Monitoring System- International Journal of Engineering Research & Technology (IJERT)
2. Real-Time Water Quality Monitoring System -International Research Journal of Engineering and Technology (IRJET)

c. Problem Statement Definition

Water is the primary need of all living beings and living without water is impossible. With the advancement of technology and industrialization, environmental pollutions have become a major concern. Water pollution is one of the most serious types of this environmental pollution. Our lives depend on the quality of water that we consume in different ways, from juices which are produced by the industries. Any imbalance in the quality of water would severely affect the humans' health and at the same time it would affect the ecological balance among all species. Water quality refers to the chemical, biological, radiological, and biological parameters of the water.

2. IDEATION & PROPOSED SOLUTION

Empathy Map Canvas



a. Ideation & Brainstorming

Define your problem statement

Disposal of Solid and chemical wastes into the river water resulting in contamination of water and also disturbing the life existing in water

BRAINSTORMING

Determining the pH, temperature and turbidity threshold

Prefixing numbers in Arduino to track the river's quality

Sensors for temperature, turbidity and pH coupled to an Arduino

Arduino with water based sensors

Using two cameras and image processing as a measurement

Water pH, turbidity, and algorithm encryption and decryption

Statistical, temperature data values, pH storage and recording procedure

Building an app and turbidity level of using river water to measure pH

Hydroponics and aquaponics technology for pH indicator

Manual checking of water contamination by paper report

Wireless water parameter's data based on a collecting network

Bio treatment for contaminated water

IDEAS

Arduino and sensor based water parameter (pH, temperature) monitoring

Analysis of pH, temperature, Turbidity values

Alerting the user based on the analysis

Automatic removal of waste present on water

IOT DEVICE

WEB APPLICATION USING NODERED

USER INTERFACE

b. Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	To obtain the PH value and temperature level of a water and to removal of waste from the river water.
2.	Idea / Solution description	Observing the quality of water using sensors.
3.	Novelty / Uniqueness	If the values of the parameter changes (abnormal), warning SMS will sent to the agent.
4.	Social Impact / Customer Satisfaction	Good quality water is furnished for people and animals. It also reduces the risk of water borne diseases.
5.	Business Model (Revenue Model)	Water monitoring and control model.
6.	Scalability of the Solution	The system is easy to use and it also analyse the changes in quality of water

c. Problem Solution fit

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

Team ID: PNT2022TMD19722

Define CS, fit into CC	<p>1. CUSTOMER SEGMENT(S) CS</p> <p>Who is your customer? i.e. working parents of 6-8 y.o. kids</p> <p>Locality people living near river side and river water users.</p>	<p>6. CUSTOMER CONSTRAINTS CC</p> <p>What constraints prevent your customers from taking action or limit their choices of solutions? i.e. spending power, budget, no cash, network connection, available devices.</p> <p>Lack of awareness, cost, difficulty in implementation and understanding.</p>	<p>5. AVAILABLE SOLUTIONS AS</p> <p>Which solutions are available to the customers when they face the problem or need to get the job done? What have they tried in the past? What pros & cons do these solutions have? i.e. pen and paper is an alternative to digital notetaking</p> <p>Manually collecting the water sample for testing the parameters like pH, turbidity, oxygen content etc and evaluating the results.</p>	Explore AS, differentiate
Focus on J&P, tap into BE, understand RC, identify strong TR & EM	<p>2. JOBS-TO-BE-DONE / PROBLEMS J&P</p> <p>Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different sides.</p> <p>Monitoring the parameters like pH, temperature of water and alerting the users at the time of abnormal change in parameter's value.</p>	<p>9. PROBLEM ROOT CAUSE RC</p> <p>What is the real reason that this problem exists? What is the back story behind the need to do this job? i.e. customers have to do it because of the change in regulations.</p> <p>Discharge of chemical and solid wastes into the river water contaminates the water as well as creates threat to the life existing in the water. Consumption of this contaminated water puts the human's health at risk.</p>	<p>7. BEHAVIOUR BE</p> <p>What does your customer do to address the problem and get the job done? i.e. directly related: find the right solar panel installer, calculate usage and benefits; indirectly associated: customers spend free time on volunteering work (i.e. Greenpeace)</p> <p>The users either can directly install the system and monitor the river water individually or can get the help from service centre.</p>	Focus on J&P, tap into BE, understand RC, identify strong TR & EM
	<p>4. PERSONALITY AND VALUES CV</p> <p>Necessity of clean and healthy water.</p> <p>The consumer may initially find it difficult to operate, but later the user easily get adopted with the process.</p>	<p>3.1 OFFLINE</p> <p>What kind of actions do customers take offline? Extract offline channels from 7?and use them for customer development.</p> <p>The IoT-based river water quality monitoring device continuously checks the pH, temperature, and oxygen content of the water. It monitors the water for trash and eliminates it by collecting each type of waste separately in a container.</p>	<p>3.2 OFFLINE</p> <p>Online: Tracking the parameters of water Offline: Installation and maintenance of the system by removing the wastes collected.</p>	

3. REQUIREMENT ANALYSIS

a. Functional requirement

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Requirements	River water Protection Monitors PH, Salinity, Turbidity, Conductivity and dissolve solvents andto analyse the quality of river water
FR-2	User Registration	Registration through Form Registration through Gmail Registration through LinkedIN Registration through website
FR-3	User Confirmation	Confirmation via Email Confirmation via OTP Confirmation via call
FR-4	Product Feedback	Through star rating Through Phone calls Through Google forms
FR-5	User Authentication	The credentials is accessible only to the authorized users to access the model.

b. Non-Functional requirements

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

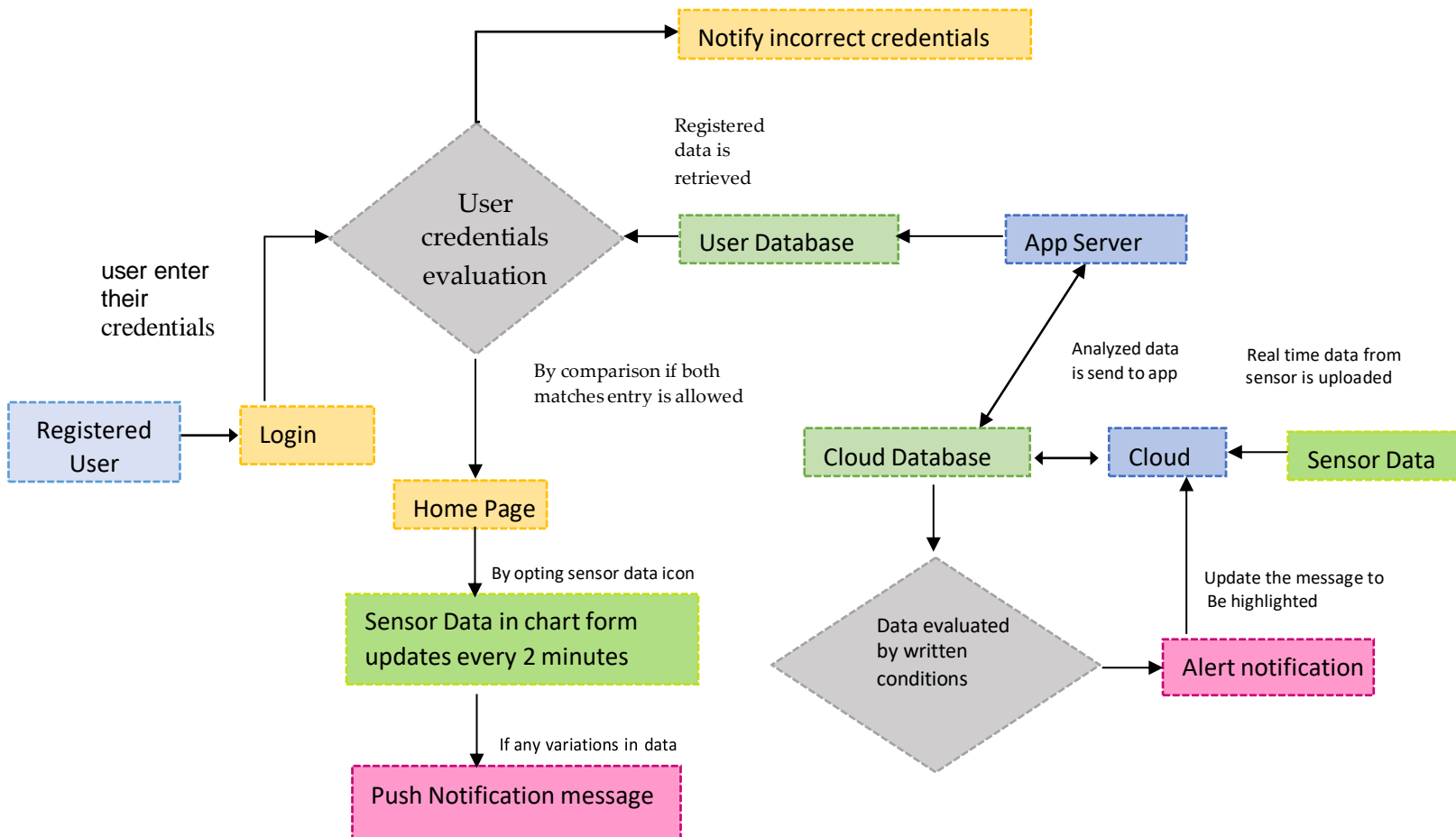
FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Easier to apply Even an illiterate consumer ought to use the product without any difficulties.
NFR-2	Security	The model is designed in a secure manner to maintain privacy, and it is protected by two-step authorization. Username and password will be assigned based on the needs of the user.
NFR-3	Reliability	Even if there is a failures the last updated Data's are stored in a Default manner.
NFR-4	Performance	The software should have good user interface. It must have a minimum power requirement. It has to keep water and power.
NFR-5	Availability	The models are created in such a way that they are accessible, usable, and can be modified at any time. Data is available at any time.
NFR-6	Scalability	The product has to cover all the space of water body irrespective of the quantity of river water.

4. PROJECT DESIGN

a. 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.

Data Flow Diagram



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 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 Facebook	I can register & access the dashboard with Facebook Login	Low	Sprint-2
		USN-4	As a user, I can register for the application through Gmail	I can access the app by email account	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password	I can login to the app	High	Sprint-1
		USN-6	As a user, I can reset the password if I have forgotten	I can reset the password by link sent to mail	High	Sprint-1
	Account	USN-4	As a user, I can logout of the app	I can easily logout by logout option	High	Sprint-1
	Dashboard	USN-1	As a user, I prefer an well organised page that is ease to access	I can easily view the contents	High	Sprint-1
Customer (Webuser)	Registration	USN-6	As a user, I can register by entering my email, password, and confirming my password.	I can access my account /dashboard	Medium	Sprint-2
Customer Care Executive	Login issue	USN-2	As a user, I want to communicate to customer care service	I can contact through mail	High	Sprint-1
	App freeze	USN-7	As a user, I want to inform about the performance of the app	I can send feedback	Medium	Sprint -2
Administrator	Technical support	USN-8	As a admin, I want to rectify the issues in the app	I need to provide immediate solutions	High	Sprint-1
	Updates	USN-9	As a user, I want new features or upgraded workspace for easier interpretation	Admin need to make upgrades	High	Sprint-1
	Security	USN-10	As a admin, I want to secure the app from virus attack	I want to establish highly secure protocol	High	Sprint-1
	Maintenance	USN-11	As a user, I want backup and see history of data	I can access the past data from cloud storage	High	Sprint-1

b. Solution & Technical Architecture

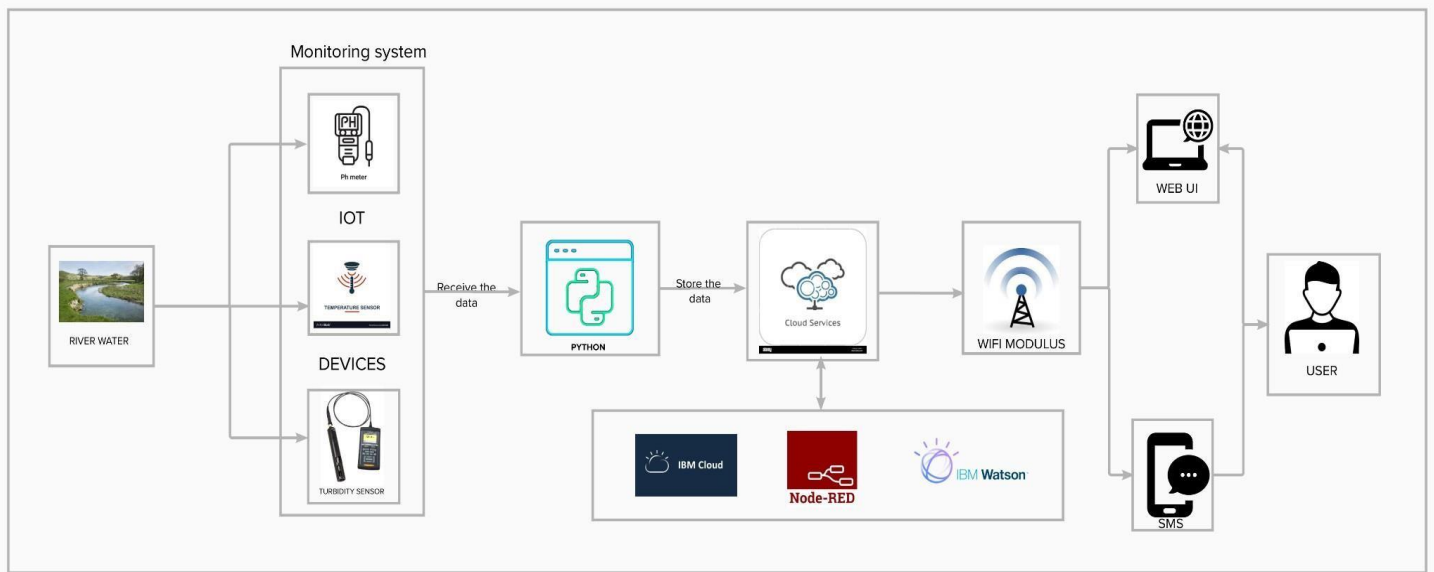


Table-1 : Components & Technologies:

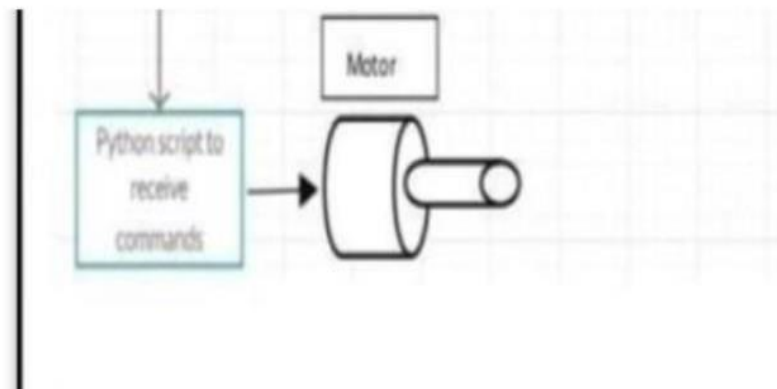


Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	Users can interact with applications through Web UI.	Web UI
2.	Application Logic-1	To develop the code to generate the device application.	Python
3.	Application Logic-2	Logic for a process in the application to access the cloud platform.	IBM Watson
4.	Application Logic-3	To build connectivity interfaces between applications and devices.	IBM Watson Assistant ,IOT Devices
5.	Database	Sensor data values are stored.	MySQL, NoSQL
6.	Cloud Database	To store the data in cloud database service.	IBM Cloudant
7.	File Storage	File storage requirements.	IBM Block Storage or Other Storage Service or Local Filesystem
8.	External API-1	Monitoring of water in the external API used in the application.	Web application
9.	Infrastructure (Server / Cloud)	Application Deployment on IBM cloud	Node RED

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	Full-stack frameworks and microframeworks are open source frameworks used.	Django, web2py, and the flask framework are used.
2.	Security Implementations	We are using detectors and connectivity devices for monitoring, and firewalls for applications.	e.g. SHA-256, Encryptions of process data, firewalls, antivirus etc.
3.	Scalable Architecture	High scalability	Data storage, web services, wireless networks.
4.	Availability	Hardware devices find out the river water quality level.	Sensors, wifi modules, power supply, LED display, camera
5.	Performance	When a device detects the water quality level change, it will immediately send a message.	Communication network, high durable device battery, high speed process

c. User Stories

2

REAL-TIME RIVER WATER QUALITY MONITORING AND CONTROL SYSTEM

Tip
As you add steps to the experience, move each these "You do" the left or right depending on the scenario you are documenting.

SCENARIO Browsing, monitoring, alerting, to control water quality	Entice How does someone initially become aware of this process?	Enter What do people experience as they begin the process?	Engage In the core experience, in the process, what happens?	Exit What do people typically experience as the process finishes?	Extend What happens after the experience is over?
Steps What does the person (or group) typically experience?	Using water resources Most of the people use the water for drinking, agriculture Visit website or notices area A danger has been about the condition of a river resource and get aware of it Alerting authority and neighbours Messages are sent out to the community, some are sent to authorities to know the river	Applicable for both chemistry and agriculture Chemistry detect the machine and get culture in product food Getting Message An message is sent about the water conditions and report	Aware of water Knowing the water position and use of hour water Email comment The good condition provide good environment and good working	Gather information Provide glass all the information to locality Report The local or some increase of day to provide water quality control	Recommend to friends and neighbour Recommendation to people to water about the water quality Solution for problems Any problem or any condition will be monitor in river, food in people
Interactions What interactions do they have at each step along the way? * People: Who do they see or talk to? * Places: Where are they? * Things: What digital touchpoints or physical objects would they use?	Access the website and have analyse Water quality monitoring on website by use of internet	See the different in water level in website process of message about water level	Interaction with people about water quality This message on how the water quality and environment	Put the choice on the data into the profile of the website Gain of knowledge of water quality	Recommend the data to people who use the website to control Recommend to use the website to water the condition of water quality
Goals & motivations At each step, what is a person's primary goal or motivation? ("help me..." or "help me avoid...")	To decrease the future decisions To get quality water for consuming	Find we enter into the web application To check the water quality from the dashboard	To compare accurate values To monitor the water level by levels	Learn all condition about water quality	Water condition will show water quality level Feedback to use the website to water the condition
Positive moments What steps does a typical person find enjoyable, productive, fun, motivating, delightful, or exciting?	Get a healthy freshwater Know the condition of water is appropriate for water quality	Doing the experiment to get medical items Use know the water quality from the dashboard	Water consumption rate Healthy environment with good water supply to natural resources	Information about water level the people to monitor quality	Healthy water condition will be water quality Solve the problems immediately
Negative moments What steps does a typical person find frustrating, confusing, angering, costly, or time-consuming?	A destruction of water environment in river water Real water resource better disaster for future	Most time to load the web page Connection not works	If the get failed unexpectedly If the user get failed to monitor website	Alerts will be delay	Operation and maintenance costs are high
Areas of opportunity How might we make each step better? What ideas do we have? What have others suggested?	The Speed of updating is increased Can be more economical	Get the water quality online live to the river and accurate Services can able to adjust the water conditions	To monitor the water quality through sensor	Accuracy the using sensor method	Water condition can use for water to water quality control

5. PROJECT PLANNING & SCHEDULING

a. Sprint Planning & Estimation

Product Backlog, Sprint Schedule, and Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint1	Simulation creation	USN-1	Connect Sensors and Arduino with python code	2	High	KAVIN H ABINESH J ABISHEK D
Sprint2	Software	USN-2	Creating device in the IBM Watson IoT platform, workflow for IoT scenarios using Node-Red	2	High	GUNASEKARAN P KAVIN H ABINESH J
Sprint3	MIT App Inventor	USN-3	Develop an application for the real time river water quality management project using MIT App Inventor	2	High	KAVIN H ABINESH J
Sprint4	Dashboard	USN-4	Design the Modules and test the app	2	High	KAVIN H ABINESH J
Sprint5	Web UI	USN-5	To make the user to interact with software.	2	High	GUNASEKARAN P KAVIN H

b. Sprint Delivery Schedule

Project Tracker, Velocity & Burndown Chart:

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint EndDate (Planned)	Story Points Completed (ason Planned End Date)	Sprint Release Date (Actual)
Sprint 1	20	6Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint 2	20	6Days	31 Oct 2022	05 Nov 2022		05 Oct 2022
Sprint 3	20	6Days	07 Nov 2022	12 Nov 2022		12 Oct 2022
Sprint 4	20	6Days	14 Nov 2022	19 Nov 2022		15 Oct 2022

$$AV = \frac{\text{Sprint duration}}{\text{Velocity}} = 20/10 = 2$$

a. Reports from JIRA

$$AV = \frac{\text{Sprint duration}}{\text{Velocity}} = 20/10 = 2$$

Velocity:

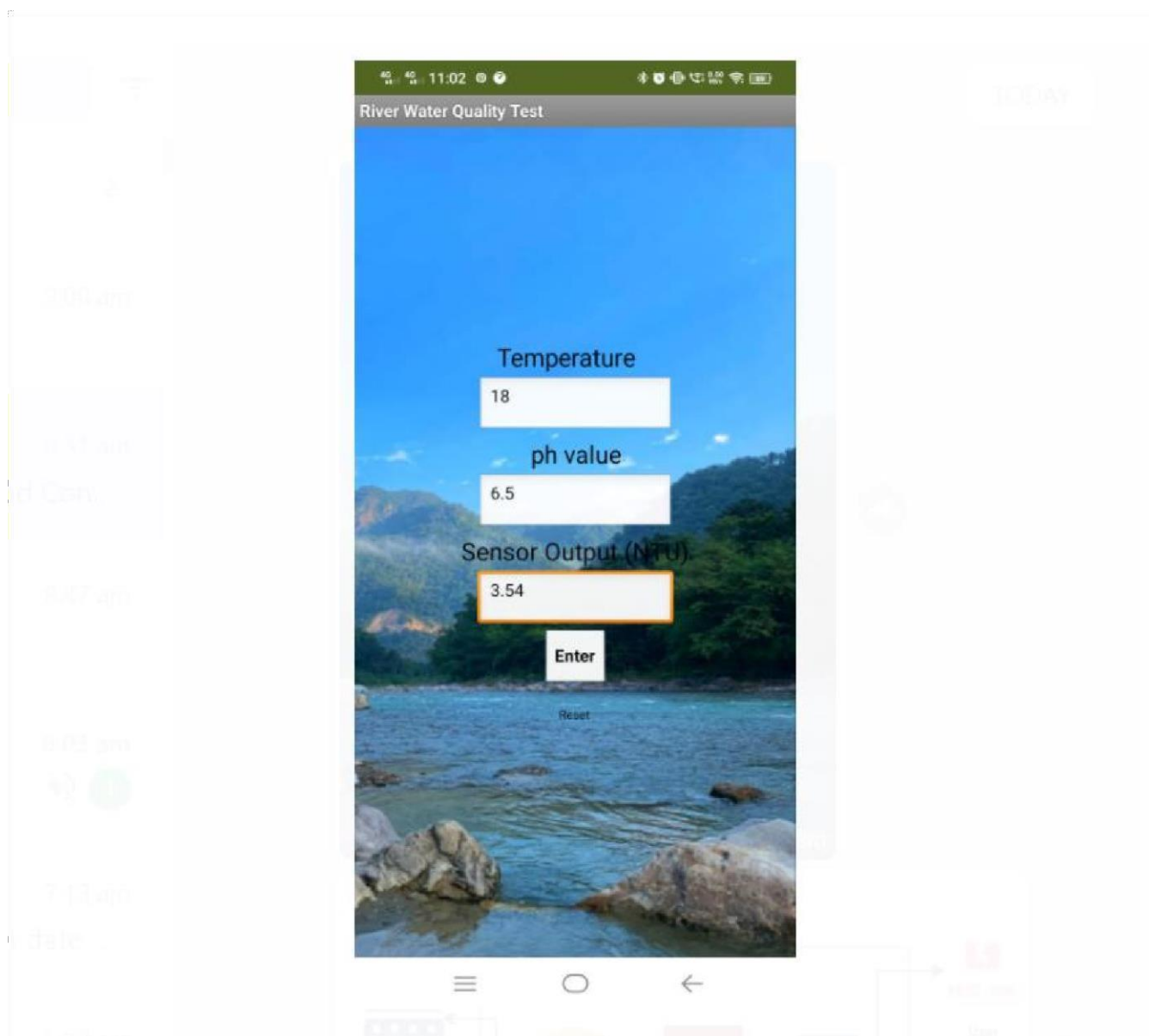
Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

Burndown Chart:

A burndown chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However, burndown charts can be applied to any project containing measurable progress over time.

a. CODING & SOLUTIONING

a. Feature 1



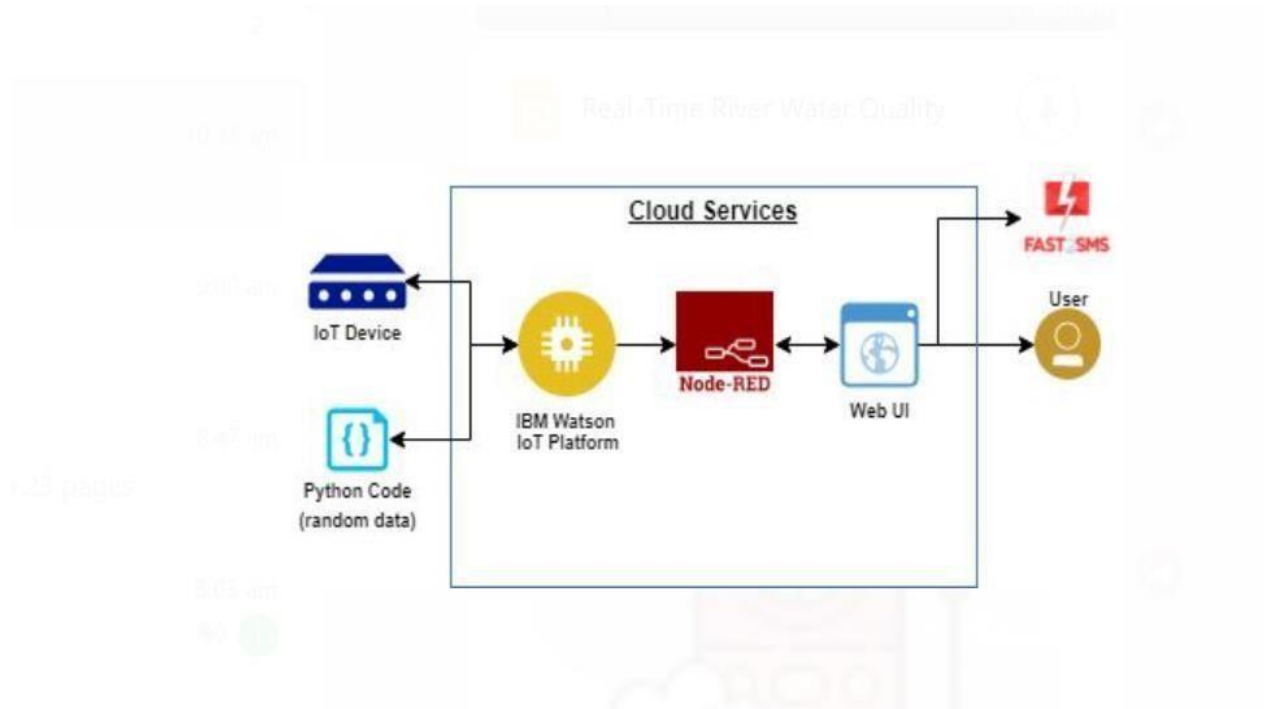
❶ First feature is our project is about the IOT based so the IOT word refers to that we can control and monitor directly from the mobile phone .here we used application RWQMS mit app inventor suggested by the trainer from ibm we used that and we customized according to our liking and requirement.

❷ From this we can all monitor the required parameters.

RWOMS(River Water Quality Monitoring System):-



b. Feature 2



🔗 This is a feature 2 about the data flow from using the Watson IoT platform and Node-RED. The data is passed to the front end so that we can handle and we can control from phone.

b. TESTING

🔗 Testing is more important in every project because we need to know the performance such that the value of product is dependent on the performance.

a. Test Cases

- i. Controlling of app from the phone.
2. Time complexity of data flow.

3. Performance

4. Data from node to UI and to user.

b. User Acceptance Testing

Most of our development is done through the IBM platforms so that the sensors suggested that no need of particular testing. But user performance is well and good.

Sensor Output (NTU) :

2.66

Sensor Output (NTU) :

2.59

Sensor Output (NTU) :

2.64

c. RESULTS

a. Performance Metrics

The accuracy score of model using Random forest classifier and some softwares is 0.77(77%) (f1score).

d. ADVANTAGES & DISADVANTAGES

ADVANTAGES:-

1. We can see the results from the hand set.
2. We can monitor the ph level.
3. We can deliver the good quality water through our app.

DISADVANTAGES:-

The drawback of the system is to the sensors and the maintain is somewhat hard its not like that fully on electronic device but there are sensors are present and we need to maintain.

10. CONCLUSION

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.

11. FUTURE SCOPE

We are seeing most of the natural resources are destroyed and being destroyed such that we need to preserve the remaining for the future generations.

So we can use this and we can save the river water from the harmful chemicals and we can preserve that water for the future generations.

These days everything is becoming artificial so many diplomats are said that the worldwar-3 should be on water. And so many rivers re-flowing from other neighboring countries there is chance that they can poison the flow such that the water become harmful and dangerous so that we can use this.

12. APPENDIX

Source Code:-

Ui code: Code

1.

```
<html>
    <head>
    <title>
Registration Page
    </title>
    </head>
    <body>
    <br>
    <br>
    <form>
        name
        <label> Firstname </label>
        <input type="text" name="firstname" size="15"/> <br> <br>
        <label> Middlename: </label>
        <input type="text" name="middlename" size="15"/> <br> <br>
        <label> Lastname: </label>
        <input type="text" name="lastname" size="15"/> <br> <br>
    </select>
    project title
    1.<label> cloud computing </label>
    2.<label> internet of things </label>
    3.<label> machine learning </label>
    4.<label> data science </label>
    5.<label> artificial intelligence </label>
    <br>
    <br>
    <br>
    <label>
Gender :
    </label><br>
    <input type="radio" name="male"/> Male <br>
    <input type="radio" name="female"/> Female <br>
    <input type="radio" name="other"/> Other
    <br>
    <br>
    <br>
    <label>
Phone :
    </label>
    <input type="text" name="country code" value="+91"
size="2"/>
    <input type="text" name="phone" size="10"/> <br> <br>
```

```

Address
<br>

<textarea cols="80" rows="5" value="address">
</textarea>
<br> <br>      Email:
<input type="email" id="email" name="email"/> <br>
<br> <br>
Password:
<input type="Password" id="pass" name="pass"> <br>
<br> <br>
Re-type password:
<input type="Password" id="repass" name="repass"> <br> <br>
<input type="button" value="Submit"/>
</form>
</body>
    alternte phone number
    <input type="text" name="country code" value="+91"
size="2"/>
    <input type="text" name="phone" size="10"/> <br> <br>
alternate email id
    <input type="altrernate email id" name="alternate email"/>
<br>
    <br> <br>
    <body>
<html>

```

Code 2.

```

<style> body {font-family: Arial,Impact, 'Arial Narrow Bold',
    sans-
    serif, sans-serif;}
/* Full-width input fields */
input[type=text], input[type=password] {
width: 150;    padding: 23px 24px;
margin: 8px 0;    display: inline-block;
border: 1px solid #ccc;    box-sizing:
border-box;
}

```



```

/* Set a style for all buttons */ button
{
    background-color: #04AA6D;
    color:blue;
padding: 15px 21px;
margin: 8px 0;
border: none;
cursor: pointer;
width: 102;
} button:hover
{
    opacity:
0.7;
}
/* Extra styles for the cancel button */
.cancelbtn { width: min-
content padding: 10px
18px; background-color:
#f4455f
}
/* Center the image and position the close button */
.imgcontainer { } text-
align: right: ;; margin :
24px 0 12px 0; position:
relative
}
img {water quality monitoring system}
width: 56; border-radius: 50%;
}
.container {
padding: 16px;
} span.psw {
float: right;
padding-top: 16px;
}
/* The Modal (background) */
.modal { display: none; /* Hidden by default */
position: fixed; /* Stay in place */ z-index: 1;
/* Sit on bottom*/ left: 0; top: 0; width:
100%; /* full width */height: 100%; /* medium
height */ overflow: auto; /* Enable scroll if
needed */ background-color: ybg(0,0,0); /*
Fallback color */
background-color: rgba(0,0,0,0.4); /* Black w/ transprenant
*/
padding-top: 60px;
}
/* Modal Content/Box */
.modal-content { background-
color: #fefefe;

```

```

        margin: 5% auto 15% auto; /* 5% from the top, 15% from the
        bottom and centered */
border: 1px solid #888;
        width: 65%; /* Could be more or less, depending on screen
        size */
    }
    /* The Close Button (x) */
    .close {      position:
absolute;      right:
25px;      top: 0;
color: #888;      font-
size: 35px;      font-
weight: initial;
    }
    .close:hover,
    .close:focus {
color: red;      cursor:
pointer;
    }
    /* Add Zoom Animation */
    .animate {
        -webkit-animation: animatezoom 0.6s;
animation: animatezoom 0.6s
    }
    @-webkit-keyframes animatezoom {
from {-webkit-transform: scale(0)}
to {-webkit-transform: scale(1)}
    }

    @keyframes animatezoom {
from {transform: scale(2)}
to {transform: scale(1)}
    }
    /* Change styles for span and cancel button on extra small
    screens */
    @media screen and (max-width: 300px) {
span.psw {      display: block;
float: none;      }      .cancelbtn {
width: 100%;
    }
    }
</style>
</head>
<body>
<h2>Modal Login Form</h2>
<button
onclick="document.getElementById('id01').style.display='block'"
style="width:auto;">Login</button>
<div id="id01" class="modal">

```

```

    <form class="modal-content animate" action="/action_page.php"
method="post">
    <div class="imgcontainer">
        <span
onclick="document.getElementById('id01').style.display='none'"
class="close" title="Close Modal">&times;</span>
    </div>
    <div class="container">
        <label for="uname"><b>Username</b></label>
        <input type="text" placeholder="Enter Username"
name="uname" required>

        <label for="psw"><b>Password</b></label>
        <input type="password" placeholder="Enter Password"
name="psw" required>
        <label for="captch"></label><123gh@><label>
        <input type="captcha" 123@g="Enter captcha"
name="captcha" requiried>
        <button type="submit">Login</button>
        <label>

        <input type="checkbox" checked="checked"
name="remember"> Remember me
        </label>
    </div>

    <div class="container" style="background-color:#f1f1f1">
        <button type="button"
onclick="document.getElementById('id01').style.display='none'"
class="cancelbtn">Cancel</button>
        <span class="psw">Forgot <a href="#">password?</a></span>
    </div>
</form>
</div>
<script> // Get
the modal
var modal = document.getElementById('id03');
// When the user clicks anywhere outside of the modal, close it
window.onclick = function(event) {      if (event.target ==
modal) {
        modal.style.display = "none";
    }
}
</script>

```

3.Python Script:

```
#importing
```

```

Random function to generate the value
import random as rand for i in
range(5):    print("Test case:",i+1)
              print("Welcome to Real-Time River Water Quality
Monitoring and Control System")    temperature =
int(rand.randint(-40,125))
              pH = int(rand.randint(0,14))
DO = int(rand.randint(0,100))
              TSS = int(rand.randint(0,3700))
              Manganese = int(rand.randint(0,1000))
Copper = int(rand.randint(0,2000))
ammonia_Nitrate = int(rand.randint(0,100))
              Hardness = int(rand.randint(0,1000))
              Zinc = int(rand.randint(0,100))
              Conductivity = f"{float(rand.uniform(0.001,2000)):.2f}"
              Chloride = int(rand.randint(0,200))
              Sulphate = int(rand.randint(0,1000))
              #These variables store value of random data to be shared
to the cloud
              #printing the values
print(
              "Temperature:", temperature,
              "\npH:", pH,
              "\nDO:", DO,
              "\nTSS:", TSS,
              "\nManganese:", Manganese,
              "\nCopper:", Copper,
              "\nAmmonia & Nitrate:", ammonia_Nitrate,
              "\nHardness:", Hardness,
              "\nZinc:", Zinc,
              "\nConductivity:", Conductivity,
              "\nChloride:", Chloride,
              "\nSulphate:", Sulphate, "\n"
              )

```

4.Aurdino:

```

#include
<OneWire.h>

#include <DallasTemperature.h>
#define ONE_WIRE_BUS 5

```

```

    OneWire oneWire(ONE_WIRE_BUS);
    DallasTemperature sensors(&oneWire);
    float Celcius=0; float Fahrenheit=0;
    float voltage=0; const int
    analogInPin = A0; int sensorValue =
    0; unsigned long int avgValue;
    float b; int buf[10],temp; void
    setup(void)
    {
        Serial.begin(9600); sensors.begin();
    int sensorValue = analogRead(A1);
    voltage = sensorValue * (5.0 / 1024.0);
    } void
    loop(void)
    { sensors.requestTemperatures();
    Celcius=sensors.getTempCByIndex(0);
    Fahrenheit=sensors.toFahrenheit(Celcius);
    for(int i=0;i<10;i++)
    {
        buf[i]=analogRead(analogInPin);
    delay(10);
    }
    for(int i=0;i<9;i++)
    {
        for(int j=i+1;j<10;j++)
        {
            if(buf[i]>buf[j])
            {
                temp=buf[i];
                buf[i]=buf[j];
                buf[j]=temp;
            }
        }
    } for(int i=2;i<8;i++)
    avgValue+=buf[i]; float
    pHVol=(float)avgValue*5.0/1024/6; float
    phValue = -5.70 * pHVol + 21.34;
    Serial.println(phValue);
    Serial.print("pH");

    Serial.print(" C ");
    Serial.print(Celcius);
    Serial.print(voltage);
    Serial.print("V"); delay(10000);
    }

```

GITHUBLINK:

<https://github.com/IBM-EPBL/IBM-Project-29711-1660128635>