**REAL TIME RIVER WATER QUALITY MONITORING**

**AND CONTROL SYSTEM**

**Category: INTERNET OF THINGS**

# A PROJECT REPORT

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## GNANAMANI COLLEGE OF TECHNOLOGY

***In fulfillment of project in IBM-NALAIYATHIRAN 2022***

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### 1.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 feilds,hence the parameters affecting the quality of river-water need to be analysed and to be used for water treatement purpose.

**2.2 References:**

* 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).

* 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).

* 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).

* 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).

* 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 Thingview 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).

* 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).

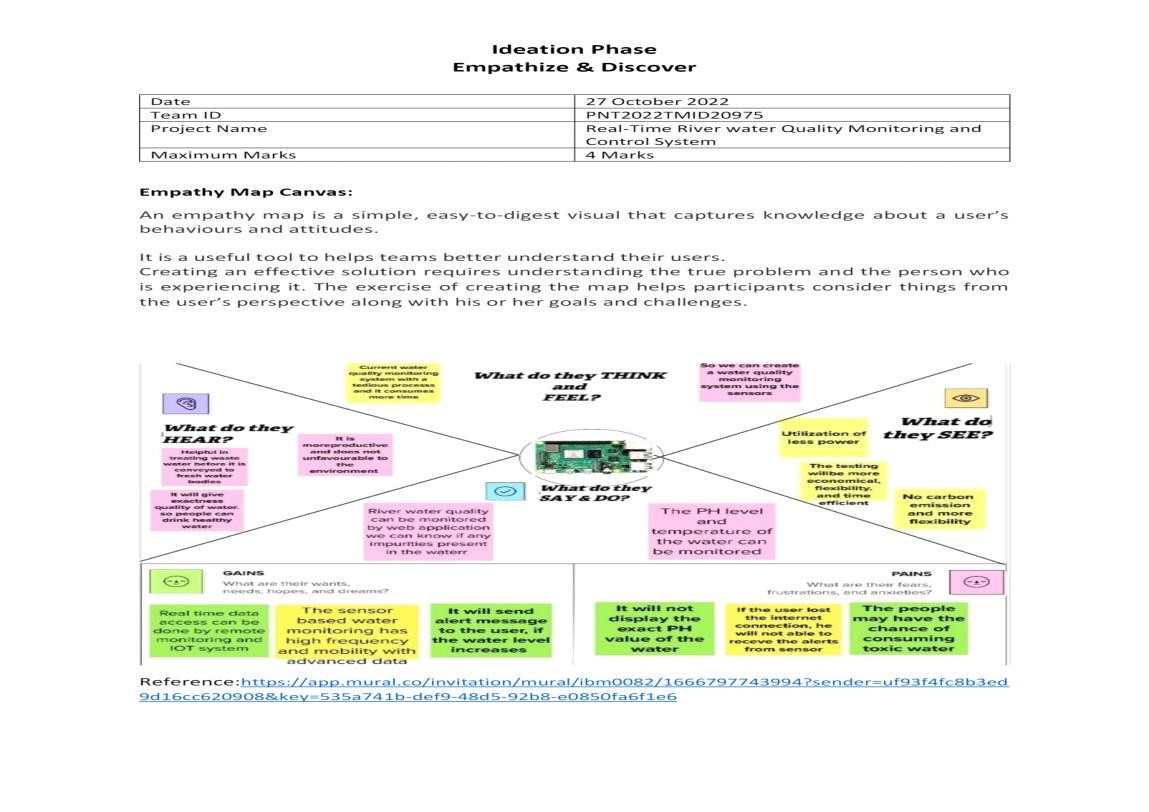
**2.3 Problem Statement:**

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.



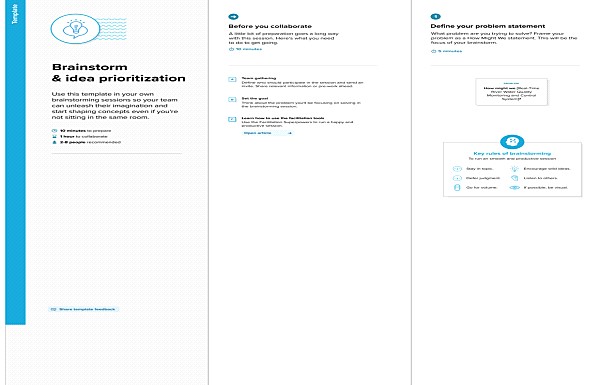
Reference:https://app.mural.co/invitation/mural/ibm0082/1666797743994?sender=uf93f4fc8b3ed9d16cc 620908&key=535a741b-def9-48d5-92b8-e0850fa6f1e6

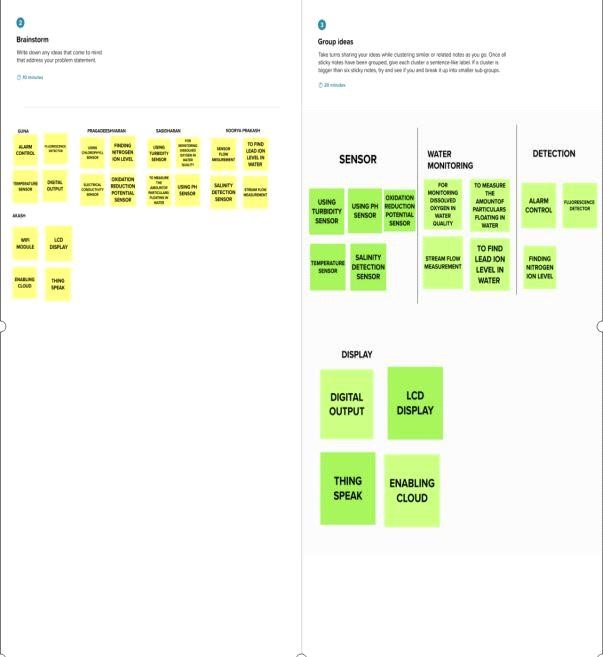
**3.2 Ideation & Brainstorming:**

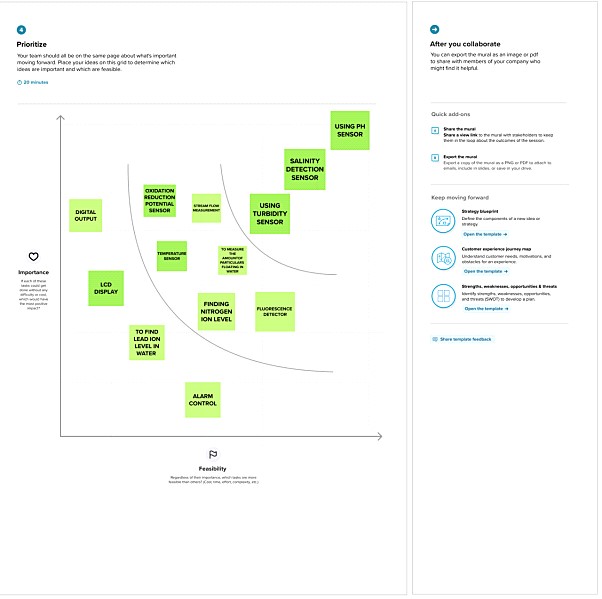
Brainstorming provides a free and open environment that encourages everyone within a team to participate in the creative thinking process that leads to problem solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate,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

Reference:https://app.mural.co/invitation/mural/ibmproject1215/1666848258091?sender=uf93f4fc8b3ed 9d16cc620908&key=d4906cd4-138e-40f9-a546-ea061cc6c665





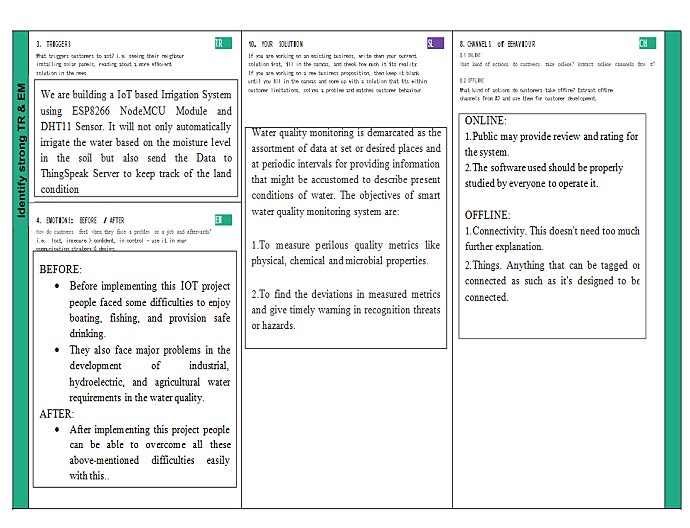


**3.3 Proposed Solution:**

|  |  |  |
| --- | --- | --- |
| **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 | |  |  |  | | --- | --- | --- | | for | checking | polluted levels,and |   We use water detection sensor has unique advantage.It consumes less time to monitor than a manual method  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. |
| 5. | Business Model  (Revenue Model) | It costs low compared to other |
| model.Our real time quality monitoring |
| model has sensors 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:**





1. **REQUIREMENT ANALYSIS**

* 1. ***Functional Requirements:***

Following are the functional requirements of the proposed solution.

|  |  |  |
| --- | --- | --- |
| **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 | 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 |
|  |

* 1. ***Non-functional Requirements:***

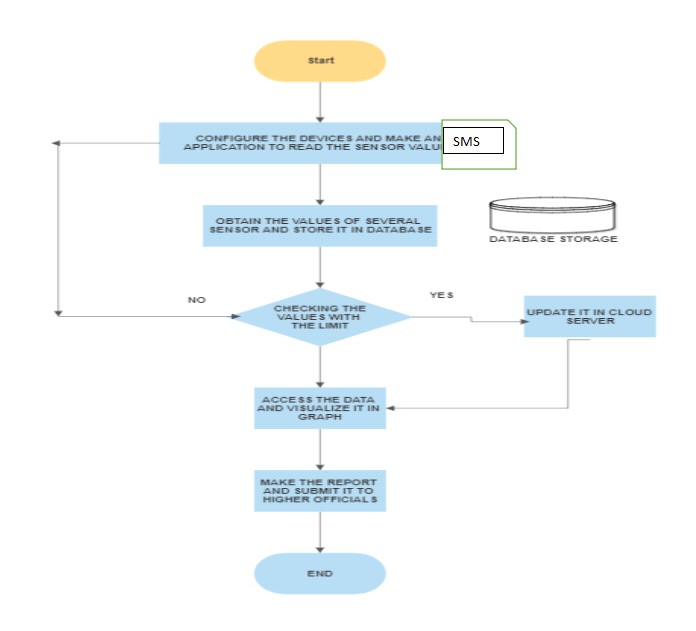
Following are the non-functional requirements of the proposed solution.

|  |  |  |
| --- | --- | --- |
| **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 Raspberry Pie. |
| the various sensor placed |
| 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 | PH-sensor |
|  |  | rivers. |  |
| 2. | Air Quality Monitoring | The clarity and purity  of river water can be monitored | 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** **Requirement** | **User Story** | **User Story / Task** | **Acceptance criteria** | **Priority** | **Release** |
|  |
| **(Epic)** | **Number** |
| 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 | I can receive | High | Sprint-1 |
|  |  |  | receive  confirmation email once I have registered for the application | confirmation email & click confirm |  |  |
|  |  | 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- | As a Admin, Update must be done at each step and take care of any errors | Heavy Monitoing is Required. | High | Sprint-2 |
| 1 |  |
|

**6.PROJECT PLANNING AND SCHEDULING**

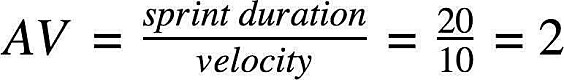
**6.1 SPRINT PLANNING & SCHEDULING:**

|  |  |  |
| --- | --- | --- |
| **TITLE** | **DESCRIPTION** | **DATE** |
| **Literature**  **Survey &**  **Information**  **Gathering** | Literature survey on the selected project is done by gathering information about related details on | 06 OCTOBER  2022 |
|  | technical papers and web browsing. |  |
| **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. | 28 OCTOBER  2022 |
| **Problem Solution Fit** | Prepared problem - solution fit document. | 30 OCTOBER  2022 |

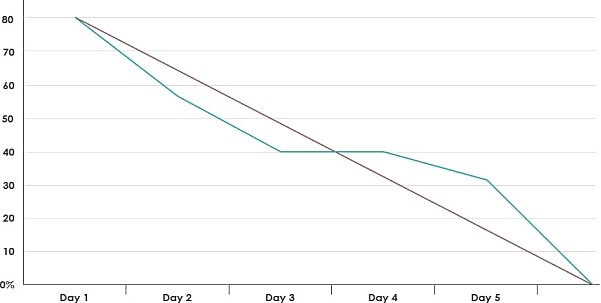
**Project Tracker, Velocity & Burndown Charts**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Sprint** | **Total**  **Story**  **Points** | **Duration** | **Sprint**  **Start Date** | **Sprint End**  **Date**  **(Planned)** | **Story Points**  **Completed**  **(ason** **Planned**  **End Date)** | **Sprint**  **Release**  **Date**  **(Actual)** |
| Sprint-1 | 20 | 6 Days | 24 Oct 2022 |  | 20 |  |
| Sprint-2 | 20 | 6 Days | 28 Oct 2022 |  | 30 |  |
| Sprint-3 | 20 | 6 Days | 03 Nov 2022 | 10 Nov 2022 | 49 |  |
| Sprint-4 | 20 | 6 Days | 08 Nov 2022 | 15 Nov 2022 | 50 | 09 Nov 2022 |

**Velocity:**



**Burndown Chart:**



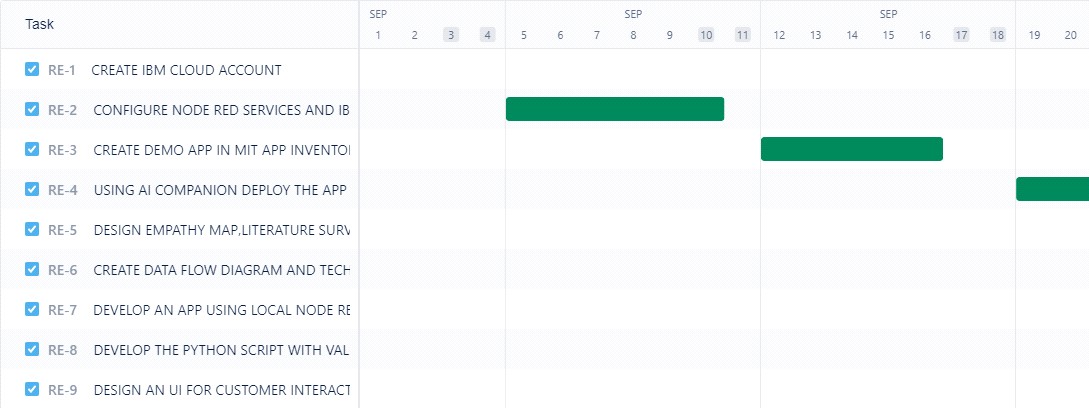
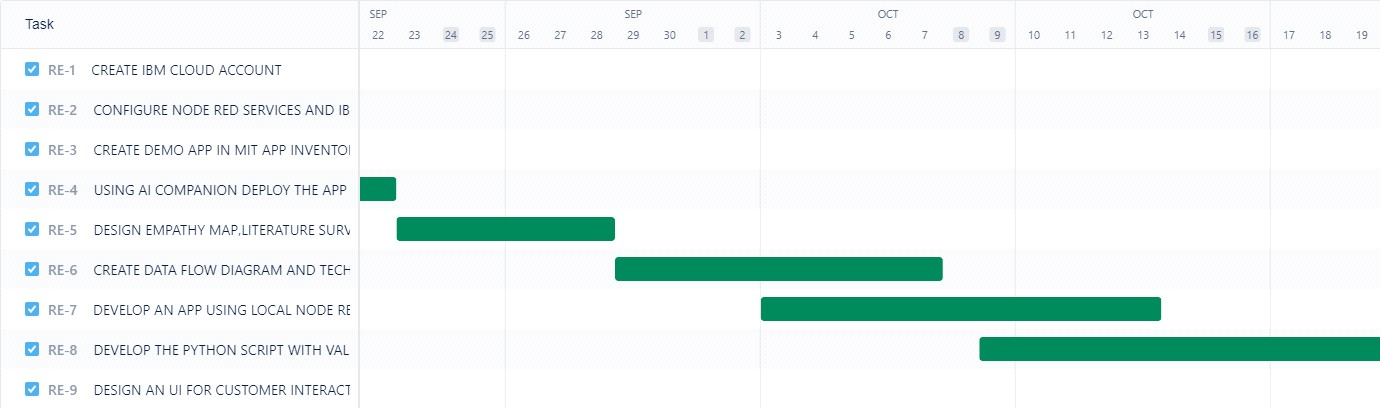
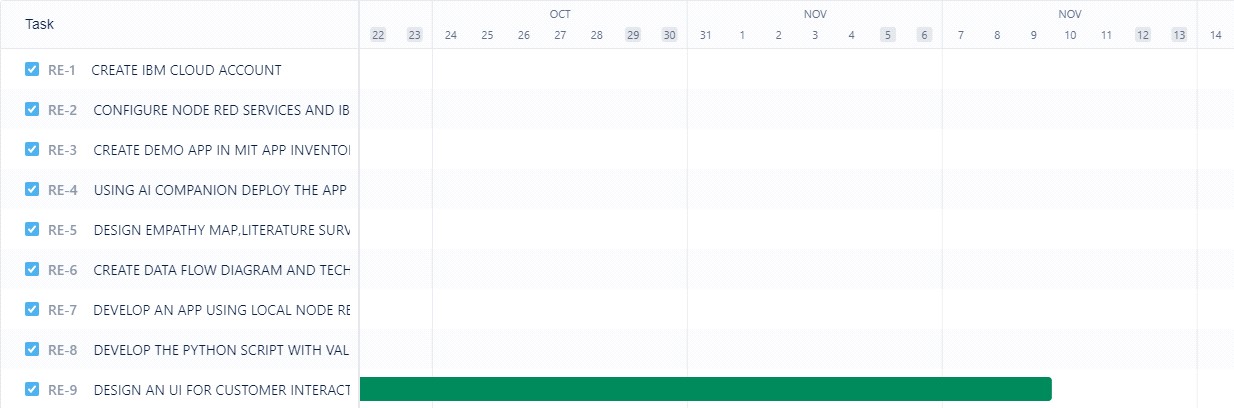
**6.3 REPORT FROM JIRA**

**REFERENCE LINK (JIRA SOFTWARE):**

[**https://ibmprojectrealtimemonitoring.atlassian.net/jira/core/projects/RE/board**](https://ibmprojectrealtimemonitoring.atlassian.net/jira/core/projects/RE/board)

**TIMELINE CREATED USING JIRA SOFTWARE**

[**https://ibmprojectrealtimemonitoring.atlassian.net/jira/core/projects/RE/list?filter=statusCategory**](https://ibmprojectrealtimemonitoring.atlassian.net/jira/core/projects/RE/list?filter=statusCategory+%3D+Done+AND+statusCategoryChangedDate+%3E%3D+-1w&showDone=true&atlOrigin=eyJpIjoiMmVlZjFiNTA2ODIxNDg0MGFmOGZlMTA2Y2M0Y2VjN2IiLCJwIjoiaiJ9)



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[**1w&showDone=true&atlOrigin=eyJpIjoiMmVlZjFiNTA2ODIxNDg0MGFmOGZlMTA2Y2M0Y2**](https://ibmprojectrealtimemonitoring.atlassian.net/jira/core/projects/RE/list?filter=statusCategory+%3D+Done+AND+statusCategoryChangedDate+%3E%3D+-1w&showDone=true&atlOrigin=eyJpIjoiMmVlZjFiNTA2ODIxNDg0MGFmOGZlMTA2Y2M0Y2VjN2IiLCJwIjoiaiJ9)

[**VjN2IiLCJwIjoiaiJ9"showDone=true HYPERLINK**](https://ibmprojectrealtimemonitoring.atlassian.net/jira/core/projects/RE/list?filter=statusCategory+%3D+Done+AND+statusCategoryChangedDate+%3E%3D+-1w&showDone=true&atlOrigin=eyJpIjoiMmVlZjFiNTA2ODIxNDg0MGFmOGZlMTA2Y2M0Y2VjN2IiLCJwIjoiaiJ9)

[**"https://ibmprojectrealtimemonitoring.atlassian.net/jira/core/projects/RE/list?filter=statusCategor y+%3D+Done+AND+statusCategoryChangedDate+%3E%3D+-**](https://ibmprojectrealtimemonitoring.atlassian.net/jira/core/projects/RE/list?filter=statusCategory+%3D+Done+AND+statusCategoryChangedDate+%3E%3D+-1w&showDone=true&atlOrigin=eyJpIjoiMmVlZjFiNTA2ODIxNDg0MGFmOGZlMTA2Y2M0Y2VjN2IiLCJwIjoiaiJ9)

[**1w&showDone=true&atlOrigin=eyJpIjoiMmVlZjFiNTA2ODIxNDg0MGFmOGZlMTA2Y2M0Y2**](https://ibmprojectrealtimemonitoring.atlassian.net/jira/core/projects/RE/list?filter=statusCategory+%3D+Done+AND+statusCategoryChangedDate+%3E%3D+-1w&showDone=true&atlOrigin=eyJpIjoiMmVlZjFiNTA2ODIxNDg0MGFmOGZlMTA2Y2M0Y2VjN2IiLCJwIjoiaiJ9)

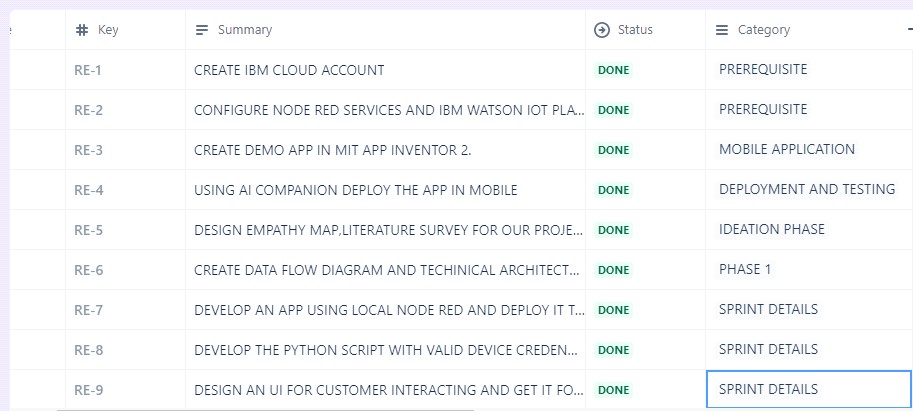
[**VjN2IiLCJwIjoiaiJ9"& HYPERLINK**](https://ibmprojectrealtimemonitoring.atlassian.net/jira/core/projects/RE/list?filter=statusCategory+%3D+Done+AND+statusCategoryChangedDate+%3E%3D+-1w&showDone=true&atlOrigin=eyJpIjoiMmVlZjFiNTA2ODIxNDg0MGFmOGZlMTA2Y2M0Y2VjN2IiLCJwIjoiaiJ9)

[**"https://ibmprojectrealtimemonitoring.atlassian.net/jira/core/projects/RE/list?filter=statusCategor y+%3D+Done+AND+statusCategoryChangedDate+%3E%3D+-**](https://ibmprojectrealtimemonitoring.atlassian.net/jira/core/projects/RE/list?filter=statusCategory+%3D+Done+AND+statusCategoryChangedDate+%3E%3D+-1w&showDone=true&atlOrigin=eyJpIjoiMmVlZjFiNTA2ODIxNDg0MGFmOGZlMTA2Y2M0Y2VjN2IiLCJwIjoiaiJ9)

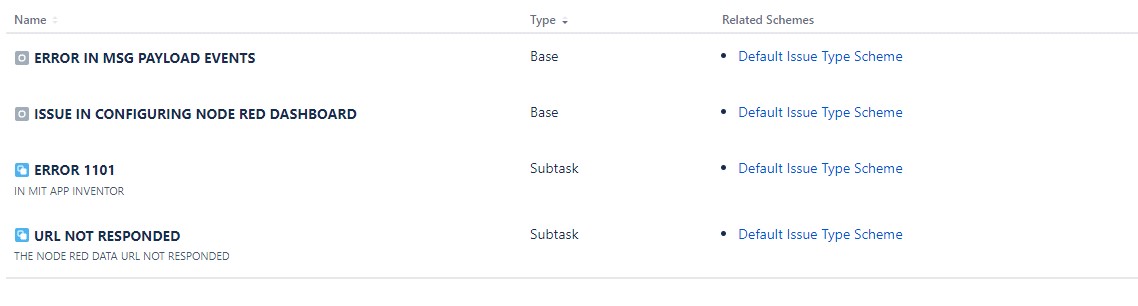
[**1w&showDone=true&atlOrigin=eyJpIjoiMmVlZjFiNTA2ODIxNDg0MGFmOGZlMTA2Y2M0Y2**](https://ibmprojectrealtimemonitoring.atlassian.net/jira/core/projects/RE/list?filter=statusCategory+%3D+Done+AND+statusCategoryChangedDate+%3E%3D+-1w&showDone=true&atlOrigin=eyJpIjoiMmVlZjFiNTA2ODIxNDg0MGFmOGZlMTA2Y2M0Y2VjN2IiLCJwIjoiaiJ9)

[**VjN2IiLCJwIjoiaiJ9"atlOrigin=eyJpIjoiMmVlZjFiNTA2ODIxNDg0MGFmOGZlMTA2Y2M0Y2 VjN2IiLCJwIjoiaiJ9**](https://ibmprojectrealtimemonitoring.atlassian.net/jira/core/projects/RE/list?filter=statusCategory+%3D+Done+AND+statusCategoryChangedDate+%3E%3D+-1w&showDone=true&atlOrigin=eyJpIjoiMmVlZjFiNTA2ODIxNDg0MGFmOGZlMTA2Y2M0Y2VjN2IiLCJwIjoiaiJ9)

**LISTS IN JIRA:**

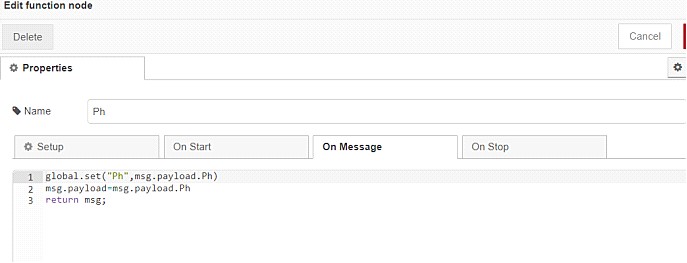
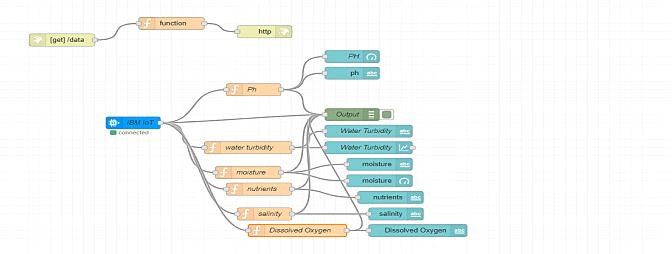


**ISSUES :**

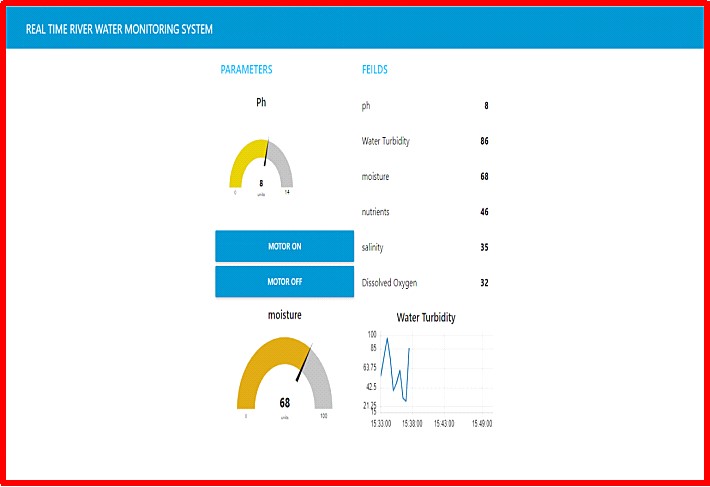
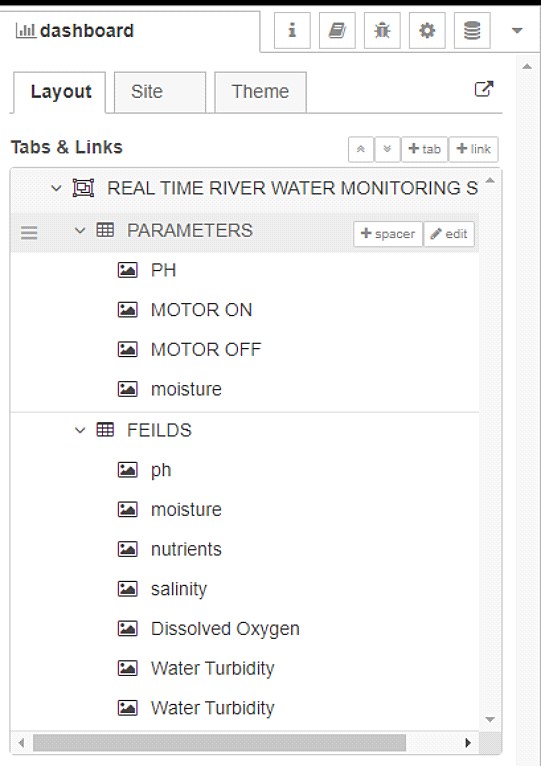


### 7.CODING AND SOLUTIONING

**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** | **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 Output | 4 | 0 | 0 | 4 |
| Version Control | 3 | 0 | 0 | 3 |

**8.2 USER ACCEPTANCE TESTING:**

* **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).

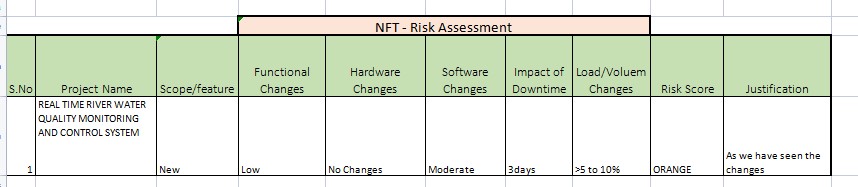
* **Defect Analysis**

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Resolution** | **Severity 1** | **Severity 2** | **Severity 3** | **Severity 4** | **Subtotal** |
| By Design |  |  |  |  |  |
| Duplicate |  |  |  |  |  |
| External |  |  |  |  |  |
| Fixed |  |  |  |  |  |
| Not Reproduced |  |  |  |  |  |
| Skipped |  |  |  |  |  |
| Won't Fix |  |  |  |  |  |
| Totals |  |  |  |  |  |

### 9.RESULT

**9.1 PERFROMANCE METRICS:**



**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) |
| SEVER 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 |

### 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 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.

**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 = "43itvs" #Device Type deviceType = “ NodeMCU”

#device ID

deviceId = "12345" #Method of Authentication authMethod = "use-token-auth"

#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':Di ssolvedOxygen,'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:

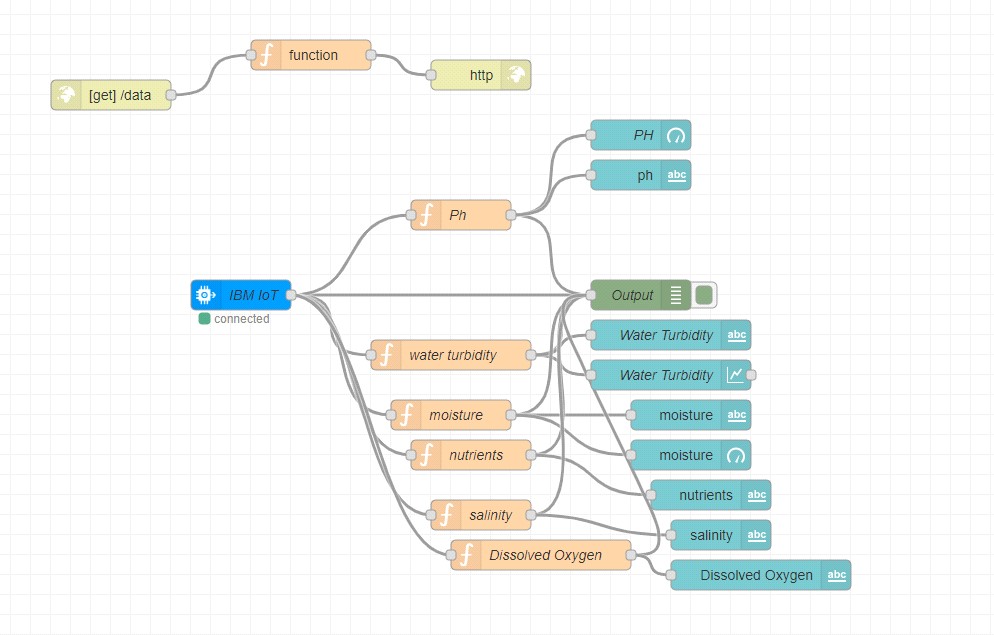
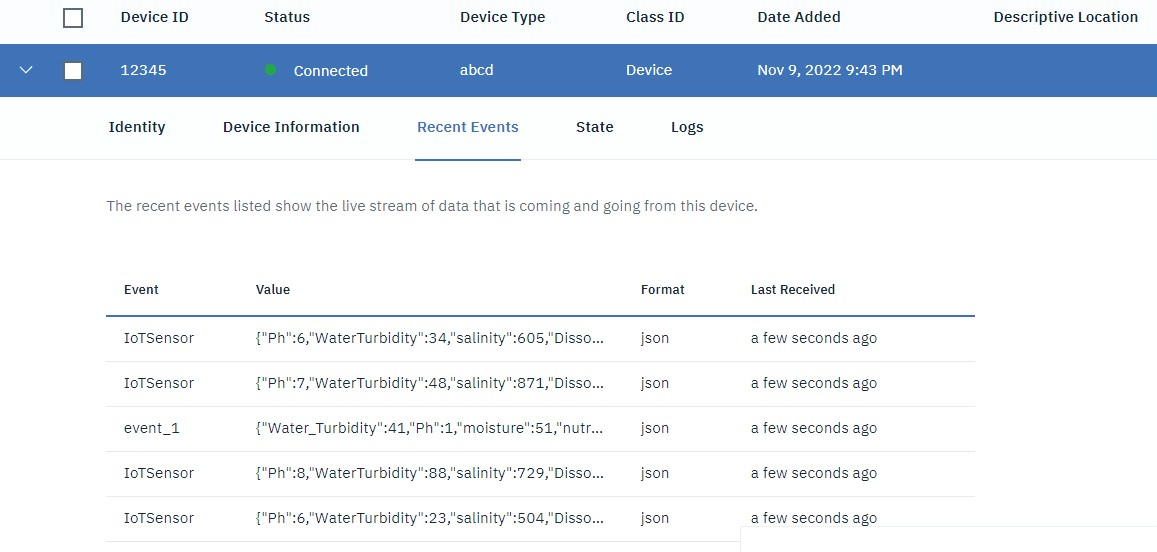
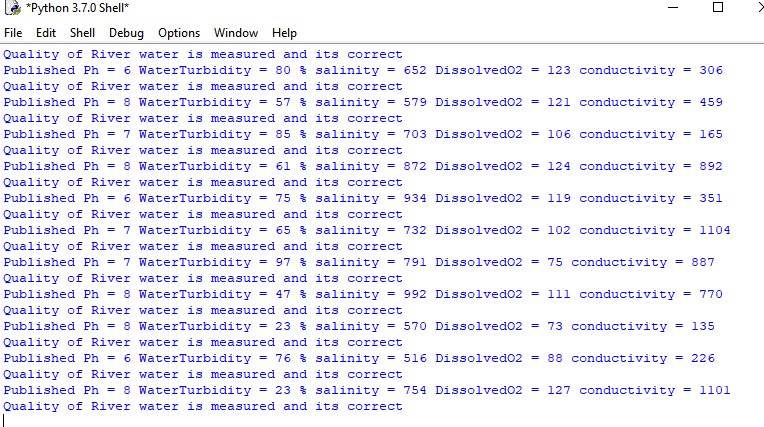
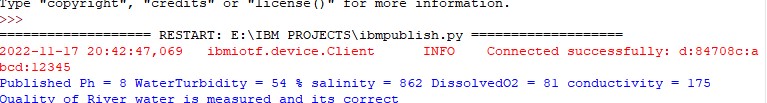
print("Quality of River water is measured and its correct")

success = deviceCli.publishEvent("IoTSensor", "json", data, qos=0, on\_publish = myonPublishCallback)

if not success: print("Not connected to IOTF")

#sleep time time.sleep(10) #disconnect device deviceCli.disconnect(**)**

**OUTPUT**



**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-bluewater-pool-texture-background-150961732.jpg"); background-color: #cccccc;

}

</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="headingsContainer">

<h3>Sign in</h3>

<p>Sign in with your username and password</p>

</div>

<!-- Main container for all inputs -->

<div class="mainContainer">

<!-- 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>

<p class="forgotpsd"> <a href="#">Forgot Password?</a></p>

</div>

<button type="submit" onclick="window.location.href = '[https://node-red-qltdp-2022-11-](https://node-red-qltdp-2022-11-07.eu-gb.mybluemix.net/ui';%22%3ELogin%3C/button)

[07.eu-gb.mybluemix.net/ui';" HYPERLINK "https://node-red-qltdp-2022-11-07.eugb.mybluemix.net/ui';%22%3ELogin%3C/button"> HYPERLINK "https://node-red-qltdp-202211-07.eu-gb.mybluemix.net/ui';%22%3ELogin%3C/button"Login HYPERLINK "https://nodered-qltdp-2022-11-07.eu-gb.mybluemix.net/ui';%22%3ELogin%3C/button"< HYPERLINK](https://node-red-qltdp-2022-11-07.eu-gb.mybluemix.net/ui';%22%3ELogin%3C/button)

["https://node-red-qltdp-2022-11-07.eu-](https://node-red-qltdp-2022-11-07.eu-gb.mybluemix.net/ui';%22%3ELogin%3C/button)

[gb.mybluemix.net/ui';%22%3ELogin%3C/button"/button>](https://node-red-qltdp-2022-11-07.eu-gb.mybluemix.net/ui';%22%3ELogin%3C/button)

<!-- Sign up link -->

<p class="register">Not a member? <a href="#">Register here!</a></p>

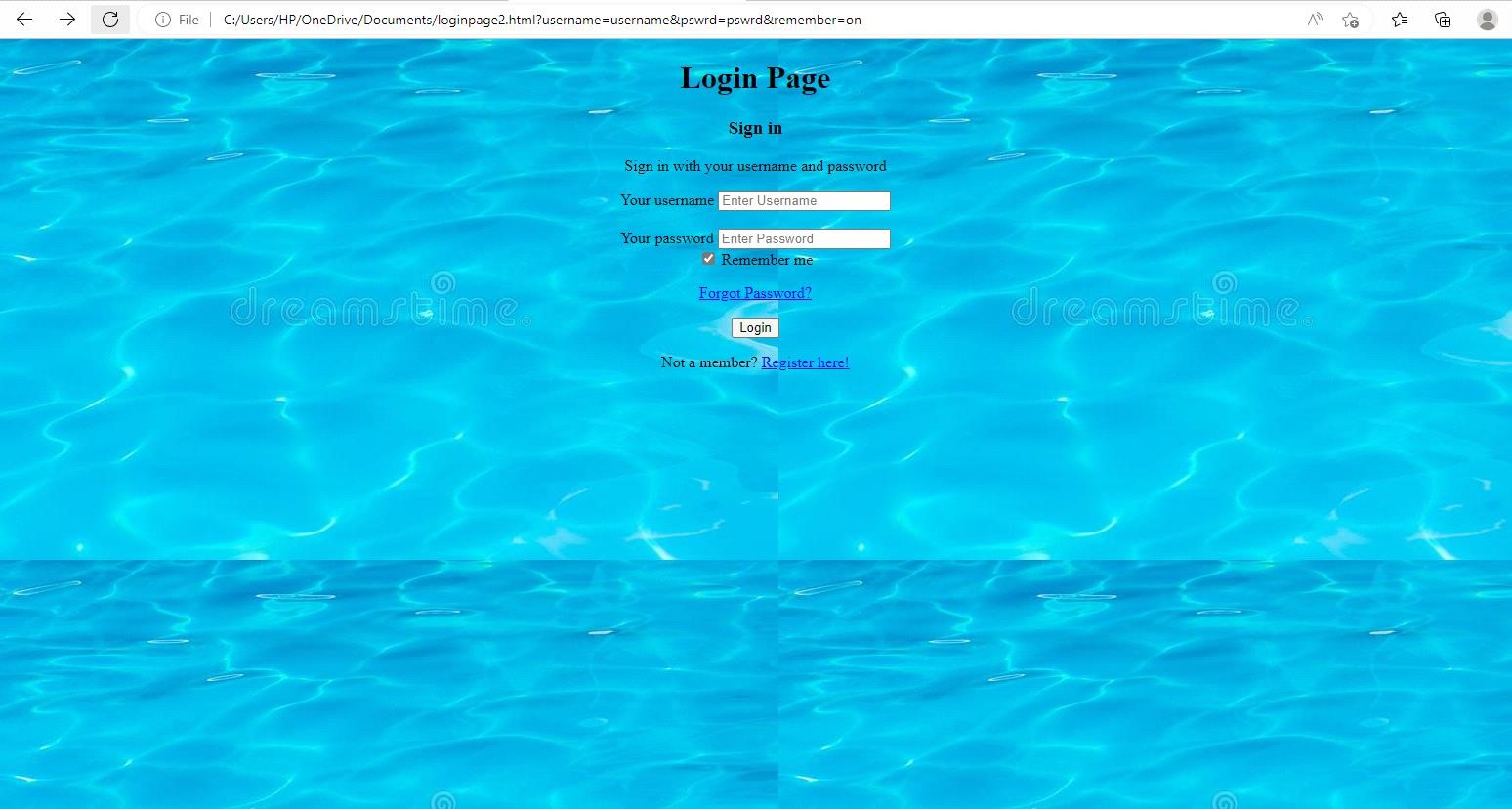
</div>

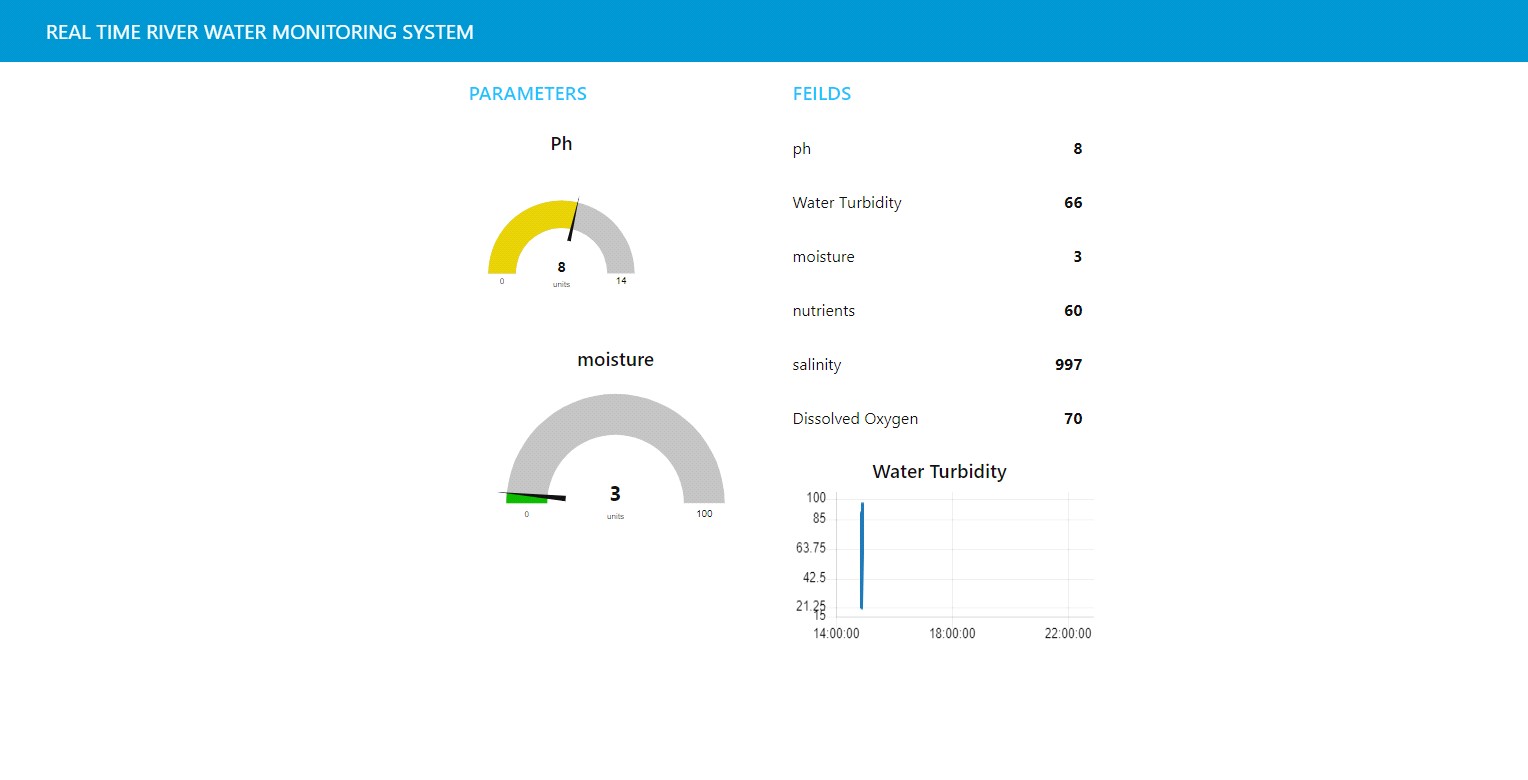
</p>

</form>

</body>

</html>





#### MOBILE APP



**13.2 GIT-HUB LINK:**

**https://github.com/IBM-EPBL/IBM-Project-37428-1660308506**

**PROJECT DEMO LINK:**

[•](https://node-red-qltdp-2022-11-07.eu-gb.mybluemix.net/ui/?socketid=WzX3XVVK_oZjhjBAAAAl#!/0)  [**https://node-red-qltdp-2022-11-07.eugb.mybluemix.net/ui/#!/0?socketid=WzX3XVVK\_oZjhjBAAAAl**](https://node-red-qltdp-2022-11-07.eu-gb.mybluemix.net/ui/?socketid=WzX3XVVK_oZjhjBAAAAl#!/0)

**2.** [**https://possible-wheat-booth.glitch.me/**](https://possible-wheat-booth.glitch.me/)