REAL-TIME RIVER WATER QUALITY MONITORING AND CONTROL SYSTEM

PROJECT BASED LEARNING

Submitted by

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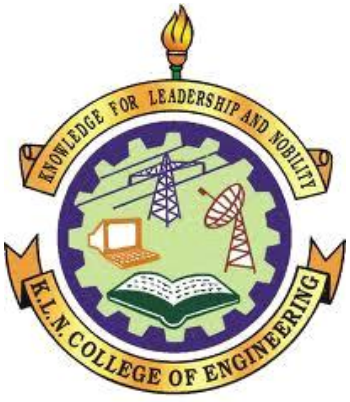
In partial fulfilment for the award of the degree

of

BACHELOR OF ENGINEERING

IN

COMPUTER SCIENCE AND ENGINEERING



K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM

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ANNA UNIVERSITY: CHENNAI 600 025

NOVEMBER 2023

ABSTRACT

Current water quality monitoring system is a manual system with a monotonous process and is very time-consuming. Real-time data access can be done by using remote monitoring and Internet of Things (IoT) technology.

Pollution of water is one of the main threats in recent times as drinking water is getting contaminated and polluted. The polluted water can cause various diseases to humans and animals, which in turn affects the life cycle of the ecosystem. If water pollution is detected in an early stage, suitable measures can be taken and critical situations can be avoided.

To make certain the supply of pure water, the quality of the water should be examined in real-time. Smart solutions for monitoring of water pollution are getting more and more significant these days with innovation in sensors, communication, and Internet of Things (IoT) technology.

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

It proposes a cost effective and efficient IoT based smart water quality monitoring system which monitors the quality parameters uninterruptedly.

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

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

1.INTRODUCTION

The Internet of Things is the concept of connecting any device (so long as it has an on/off switch) to the Internet and to other connected devices. The IoT is a giant network of connected things and people – all of which collect and share data about the way they are used and about the environment around them. Devices and objects with built in sensors are connected to an Internet of Things platform, which integrates data from the different devices and applies analytics to share the most valuable information with applications built to address specific needs.These powerful IoT platforms can pinpoint exactly what information is useful and what can safely be ignored. This information can be used to detect patterns, make recommendations, and detect possible problems before they occur. The information picked up by connected devices enables me to make smart decisions about which components to stock up on, based on real-time information, which helps me save time and money.

With the insight provided by advanced analytics comes the power to make processes more efficient. Smart objects and systems mean you can automate certain tasks, particularly when these are repetitive, mundane, time-consuming or even dangerous. The traditional method of water monitoring was done physically, using only chemicals. A water quality monitoring application involves using different IOT based smart sensors that keep track of the parameters in real time.

- # PROJECT OVERVIEW

Water is one of the main elements that significantly affect ecosystems. However, due to increasing industrialization, human waste, and the careless use of pesticides and chemical fertilizers in agriculture, which poison the water, it is now heavily exploited. In order to monitor the water quality across a large area, such as a lake, river, or aquaculture, a water

monitoring system is necessary. According to the state of the world today, Internet of Things (IoT) and remote sensing techniques are utilized in a variety of study fields to monitor, collect, and analyze data from distant locations. In this research, a real-time, lowcost water quality monitoring system in an IoT environment is suggested. Several sensors make up this system, which evaluates physical and chemical parameters. These sensors can be used to measure pH, turbidity, conductivity, and dissolved oxygen in water. This method allows for the analysis of data provided online and the real-time assessment of water body quality.

- **PURPOSE**

Water is necessary for all life, and without good watersheds, many necessary and optional human activities would be impossible. The same actions have a wide range of potential effects on watersheds. Watersheds frequently cross national, state, and local boundaries, thus even though two neighbors who live far from one another may not adhere to the same legal and cultural norms, they may still be considered members of the same watershed. By this standard, maintaining a watershed's or its lakes, streams, and rivers' health is your obligation as much as it is that of the local, state, or federal regulatory body. For the same reason, rather than being determined by governmental boundaries, water quality laws are increasingly centered on the watershed level. Streams and rivers serve as a crucial resource for human activities as well as a habitat for a variety of non-human creatures and plants. They provide an aboveground look at the hydrology and health of a watershed. Over 3.5 million miles of streams and rivers traverse various topographies in the United States alone.

The U.S. Environmental Protection Agency has discovered that, in spite of this extensive reliance on waterways, more than half of the country's streams and rivers are in poor biological condition. If your project could have an influence on a stream or river, it is essential to set up an effective monitoring system to ensure that the hydrology and water quality of the waterway are not adversely affected, and so that any impact can be remedied if it is discovered. The development of a reliable, affordable system for tracking the water quality in real time, using a wireless sensor network and the internet of things, was the overarching goal of all the initiatives.

Monitoring water quality is a problem and a concern that affects both land and sea. The European Green Deal outlines objectives for preserving biological variety and minimizing water pollution inside the European Union. It also publishes a number of directives to guarantee standards of water quality. Additionally, distinct legal frameworks for each nation state, such as France, mandate the efficient monitoring of water quality. The Environmental Protection Agency (EPA) of the United States carries out measures to manage water contamination in each state. Countries all around the world are becoming more aware of the significance of efficient monitoring techniques and metrics for water quality.

2. LITERATURE SURVEY

LITERATURE PAPER TITLE	AUTHOR	OBJECTIVE
Real-Time Water Quality Monitoring and Estimation in a IoT for Freshwater Biodiversity Conservation	Yuhao Wang Ivan Wang-Hei Ho Yang Chen	Abstract—Deteriorating water quality leads to the freshwater biodiversity crisis. The interrelationships among water quality parameters and the relationships between these parameters and taxa groups are complicated in affecting biodiversity. Nevertheless, due to the limited types of Internet-of-Things (IoT) sensors available on the market, a large number of chemical and biological parameters still rely on laboratory tests
An Energy-Efficient River Water Pollution Monitoring System in	Swati Chopade , Hari Prabhat Gupta , Rahul Mishra	Abstract—An important research issue in river water pollution monitoring is to

Internet of Things		correctly estimate and transfer the pollution data from a river to the base station by consuming minimum energy. In this paper, we propose an energy-efficient river water pollution monitoring system by using deep neural networks and long-range communication technology.

IoT Based Real-time River Water Quality Monitoring System	Mohammad Salah Uddin Chowdurya†, Talha Bin Emranb† , Subhasish Ghosha†	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 sensor

2.1 EXISITING PROBLEM

Competition for water resources is predicted to increase as a result of population expansion, urbanization, and climate change, with an impact on agriculture and river water in particular. Water quality will be ideal for potable water monitoring, spillage identification through rivers, and remote assessment for swimming pools. It contains autonomous hubs that connect to the cloud to maintain water control. Before being utilized in agricultural

areas, river water must be treated, thus it is necessary to analyses and employ for water treatment the factors that affect the river's water quality.

2.2 REFERNECES

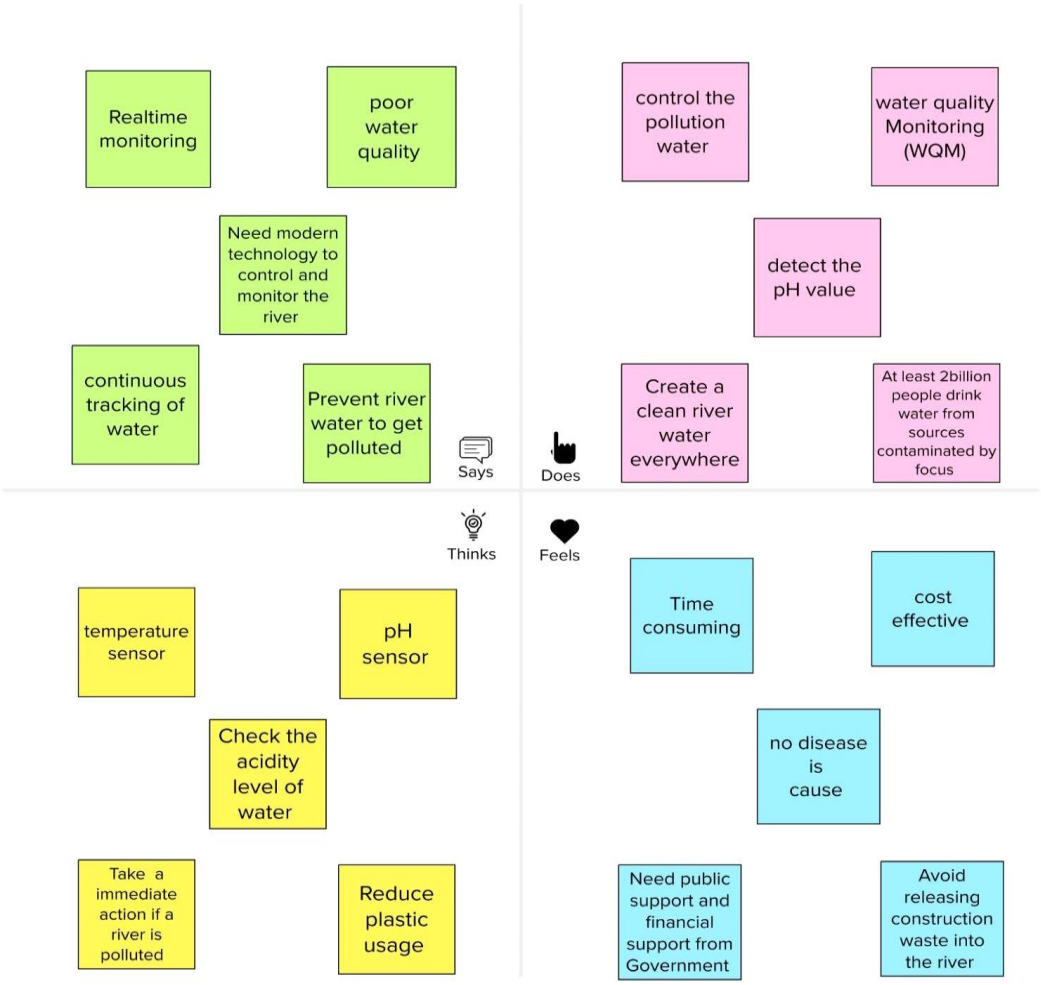
- (PDF) IoT Based Real-time River Water Quality Monitoring System (researchgate.net)
- (PDF) IoT based Smart Water Quality Monitoring System (researchgate.net)
- IoT-Based Smart Water Quality Monitoring: Evolution, Benefits, Challenges (intuz.com)
- https://ieeexplore.ieee.org/document/8480963/
- Water quality monitoring with internet of things (IoT) | IEEE Conference Publication | IEEE Xplore

3. IDEATION AND PROPOSED SOLUTION

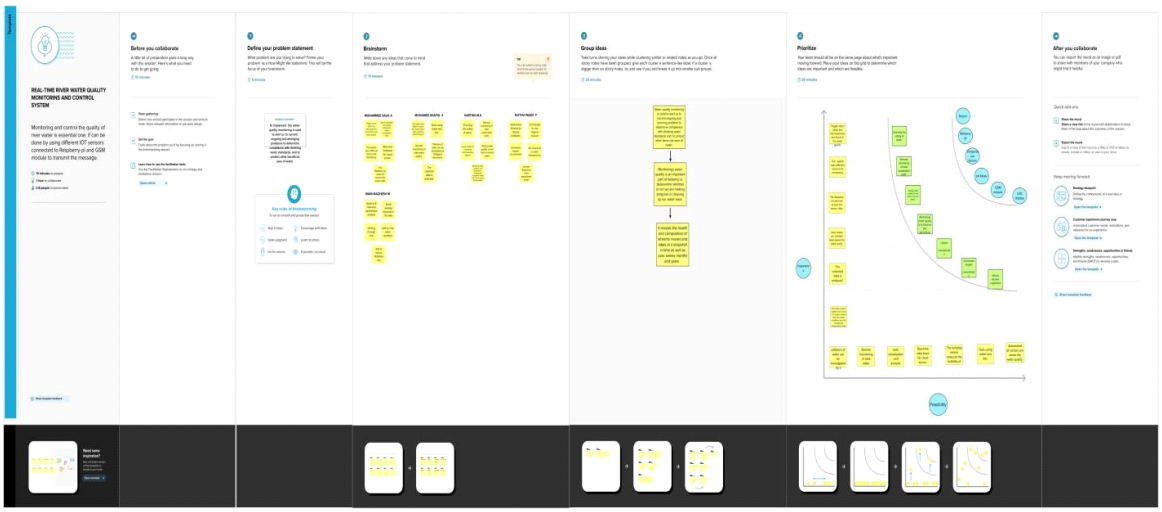
3.1 EMPTHY MAP CANVAS

Empathy Map Canvas:

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



3.2 IDEATION AND BRAINSTORMING



3.3 PROPOSED SOLUTION

Proposed Solution Template:

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	River water is a finite resource that is necessary for agriculture, industry and the survival of all living things on the planet, including humans. Sometimes the dangerous particles or chemicals are mixed in the river water and general purpose water purifier cannot purify that. And it's impossible to check the quality of river water manually in every time. Bathing in contaminated river waters causes skin diseases, allergies, and other such ailments. So an automatic real-time river water quality monitoring and control system is required to monitor the water reserved in our river water. And we can check the quality of water anytime and from anywhere.
2.	Idea / Solution description	• River water quality can be monitored by the web application. • It can be able to know if there are any dust particles in the river water. • The PH level of the river water can be monitored.

		• Water temperature can be monitored. • Alerting the authorities if the water quality is not good so that they can go and announce the localities not to drink that river water.
3.	Novelty / Uniqueness	The objective of our project is to continuously monitor the river water quality, by looking after parameters such as Temperature ,pH, dust in the water body by using many sensors. and after detection of any unwanted qualities in water, the direct SoS SMS is pushed to the Authorities in charge. The water quality from the rivers has a considerable importance for the reason that these water resources are generally used for multiple matters such as: drinking domestic and residential water supplies, agriculture (irrigation), hydroelectric, power plants, transportation and infrastructure, tourism, recreation, and other human or economic ways to use water. The uniqueness of river water monitoring and control system is to obtain the pure water from the river and get a pollutant free water from the river for agriculture field
4.	Social Impact / Customer Satisfaction	**Clean Water for Future Generations** Nearly 60% of water projects in India fail, often within the first year. This is caused by a variety of circumstances, but these two stand out as the leading factors: Increasing innovation and productivity. Gain a high field for farmer, common man and fisher man.

3.4 PROBLEM SOLUTION FIT

1. CUSTOMER SEGMENT(S)

Who is your customer ? CS

People living in rural areas near to the river who uses river water

6. CUSTOMER CONSTRAINTS

CC

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.

Water quality monitoring system is used for identify the water pollution on specific area people may find it hard to recover if any fault occurs this system prevent people from water pollution

5. AVAILABLE SOLUTIONS

AS

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

Individual notification to each people could be send its is not possible this system will still notify the corruption and they can further notify the people to aware

Focus on J&P, tap into BE, understand RC

2. JOBS-TO-BE-DONE / PROBLEMS

J&P

Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different sides.

The river water quality monitoring system that checks periodically the dust particles temperature and Ph level and gave notifies for the public when the quality various

9. PROBLEM ROOT CAUSE

RC

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.

We know that the sensors are expensive and the system needs more than one sensors to work these sensors are used periodically to check the quality of the water

7. BEHAVIOUR

BE

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)

The customer could use the user guide provided to overcome the problem or else they can report and contact the corporation they will take the action

Focus on J&P, tap into BE, understand RC

3. TRIGGERS

TR

What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading
about a more efficient solution in the news.

if certain area people start using this quality monitoring system and so they are staying healthy without any disease and harmful algal blooms thus will trigger the other affected area people to use this same system

10. YOUR SOLUTION

SL

If you are working on an existing business, write down your current solution first, fill in the canvas, and check how much it fits reality.
If you are working on a new business proposition, then keep it blank until you fill in the canvas and come up with a solution that fits within customer limitations, solves a problem and matches customer behavior.

Altering the authorities if the water quality is not good so that they can go and announce to the localities not to drink that water opr live any living things

8. CHANNELS of BEHAVIOUR

CH

8.1 ONLINE
What kind of actions do customers take online? Extract online channels from #7

if it is in online mode they can use mobile or any other sources to send the message or contact authorities via helpline number

4. EMOTIONS: BEFORE / AFTER

EM

How do customers feel when they face a problem or a job and afterwards?
i.e. lost, insecure > confident, in control - use it in your communication strategy & design.

The customer feels hard to recover their problem but now we will guide them with a user guide and they will find solution to their problem

8.2 OFFLINE
What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development.

if itis in offline mode the customer can directly reach the corporation office and report the problem

4 REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS

Functional Requirements:

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	User Authorization	Complete mapping are given in a hierarchical in order show the only one the specific data
FR-3	Historical data	Data in stored the cloud from the begin stage until the update
FR-4	User Authentication	The Credentials is accessible only the authorized users access the model
FR-5	User rules	They are some specific guide which has to be followed by the users
FR-6	LogOut	Logout the user successfuly

4.2 NON FUNCTIONAL REQUIREMENTS

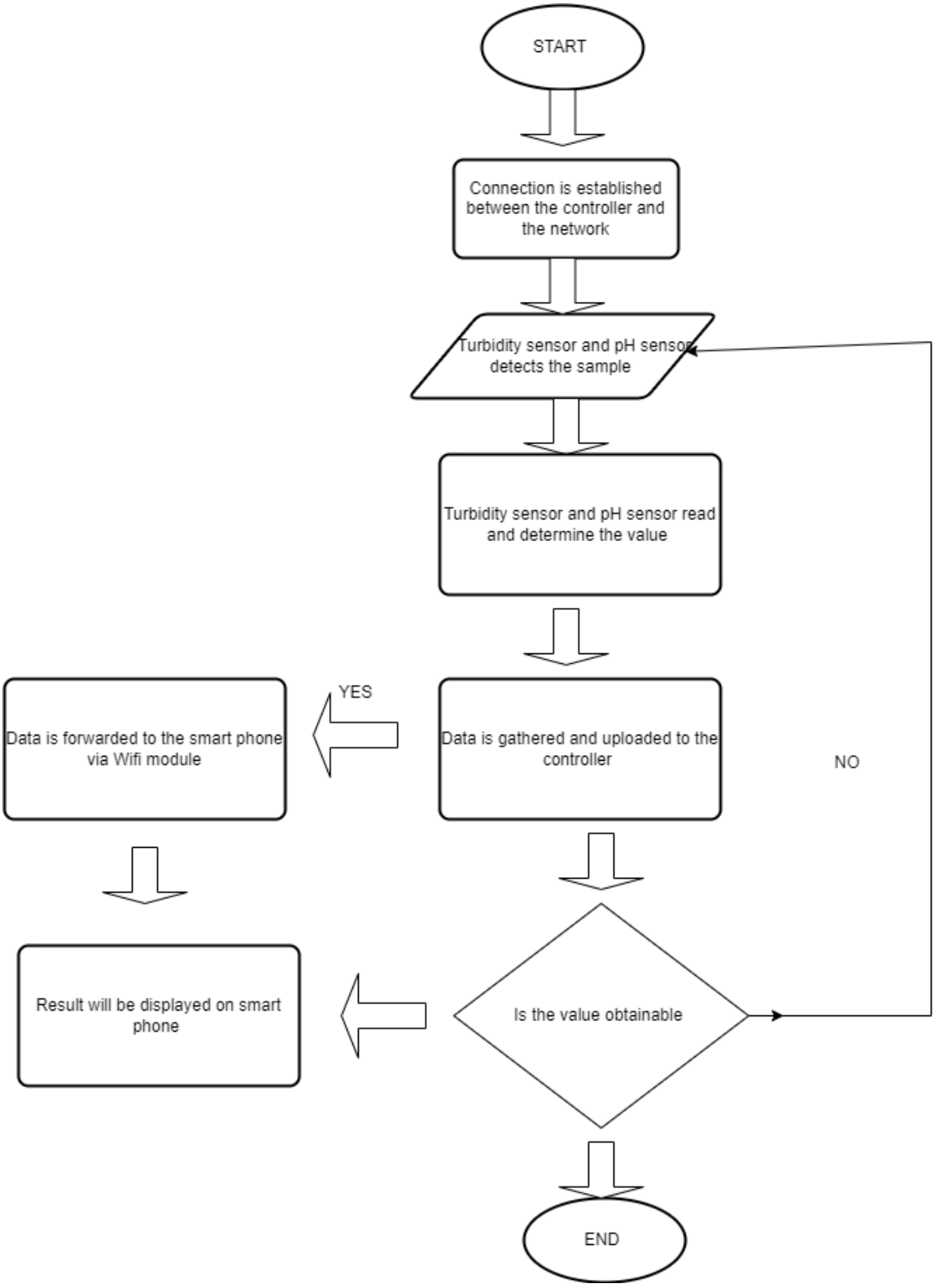
Non-functional Requirements:

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

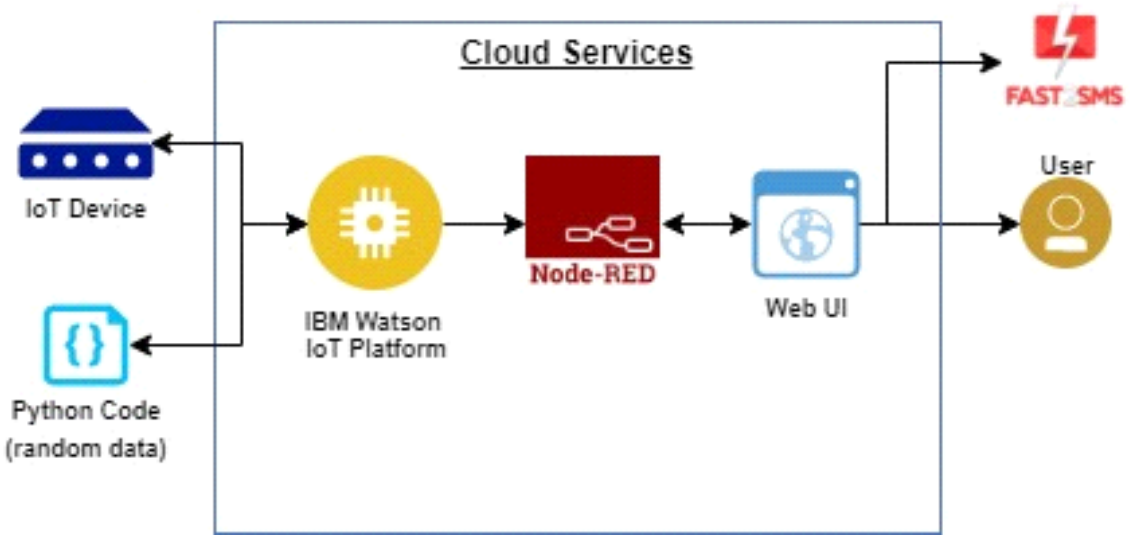
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	The final data should be easily understandable
NFR-2	**Security**	Model are designed in a secured manner in order to maintain the privacy
NFR-3	**Performance**	High quality sensors are used to easy the customer work
NFR-4	**Availability**	Model are designed in such a way that are available usable and can be modified anytime
NFR-5	**Reliability**	Even if there is a firmware issues the last update data are stored in a default manner
NFR-6	**Scalability**	The system are scales according to the size of the water body

5. PROJECT DESIGN

5.1 DATA FLOW DIAGRAM



- **SOLUTION AND TECHNICAL ARCHITECTURE**



- **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 address, password, and password confirmation.	Can gain access to my account/ Dashboard.	High	Sprint-1
		USN-2	Once I have registered for the application, I will receive a confirmation email.	I can receive an email confirmation and click/conf	High	Sprint-2

				irm.		
		USN-3	As a user, I can sign up for the app using Google.	I can use Google to register and access the dashboard .	High	Sprint-1
		USN-4	As a user, I can sign up for the application using Gmail.	I can sign up through the mail.	Medium	Sprint-2
	Login	USN-5	I can access the application as a user by entering my email address, password, and captcha.	I can obtain login informatio n.	High	Sprint-1
	Interface	USN-6	As a user, the interface should be easy to use.	I can easily gain access.	Medium	Sprint-1
Customer (Web user)	Dashboard	USN-7	As a user, I have access to specific information (pH value, temperature, humidity, and quality).	I can determine the water's quality.	High	Sprint-1
Customer	View manner	USN-8	As a user, I	Visuals	High	Sprint-

			can view data in a graphical format (graph).	help me understand better.		1
	Taste	USN-9	As a user, I can see the water's quality (saltiness).	I can easily tell if it's salty or not.	High	Sprint-1

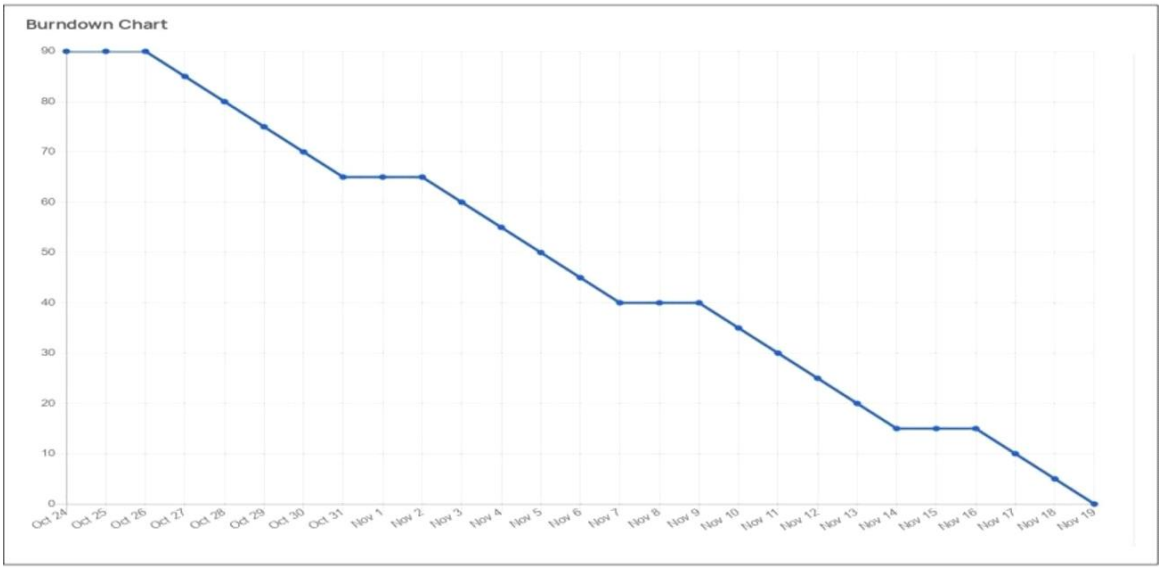
6. PROJECT PLANNING AND SCHEDULING

6.1 SPRINT PLANNING AND ESTIMATION

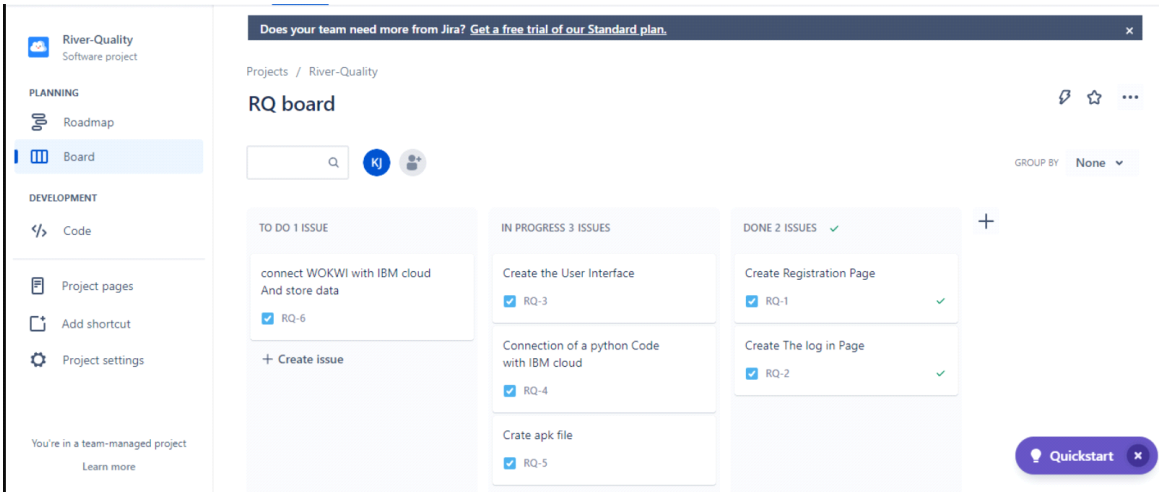
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	2	High
Sprint-1	Registration via facebook	USN-3	As a user i can register for the application through facebook	2	Low
Sprint-1	Registration via Mail ID	USN-4	As a user, I can register for the application through Gmail	2	Medium
Sprint-2	Confirmation	USN-2	As a user i will receive confirmation email once i have registered for the application	1	High
Sprint-2	Login	USN-5	As a user, I can log into the application by entering email & password	1	High
Sprint-2	IBM cloud service access		Get access to ibm cloud service	2	High
Sprint-3	Create the IBM Watson iot and device setting	USN 6	To create the ibm watson iot platform and integrate the microcontroller with it to send the sensed data on cloud	2	High
Sprint-3	Create a node red service	USN 7	To create a node red service to integrate the IBM watson along with the web ui	2	Medium
Sprint-3	To develop a python code	USN 9	Create a python code to sense the physical quantity and store data	2	Medium
Sprint	**Functional Requirement (Epic)**	**User Story Number**	**User Story / Task**	**Story Points**	**Priority**
Sprint-3	Create a web UI	USN 8	To create a web UI to access the data from the cloud and display all parameter	2	Medium
Sprint-3	Publish dta to cloud	USN 10	Publish data that is sensed by the microcontroller to the cloud	3	High
Sprint-3	Fast SMS service	USN 11	Use Fast sms to send alert messages once the parameter like pH turbidity and temperature goes beyond the threshold	3	High
Sprint-3	Testing	USN 12	Testing of project and final deliverables	3	Medium

6.2 SPRINT DELIVERY SCHEDULE

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	5 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	06 Nov 2022
Sprint-3	20	10 Days	07 Nov 2022	16 Nov 2022	20	16 Nov 2022
Sprint-4	20	9 Days	16 Nov 2022	24 Nov 2022	20	25 Nov 2022



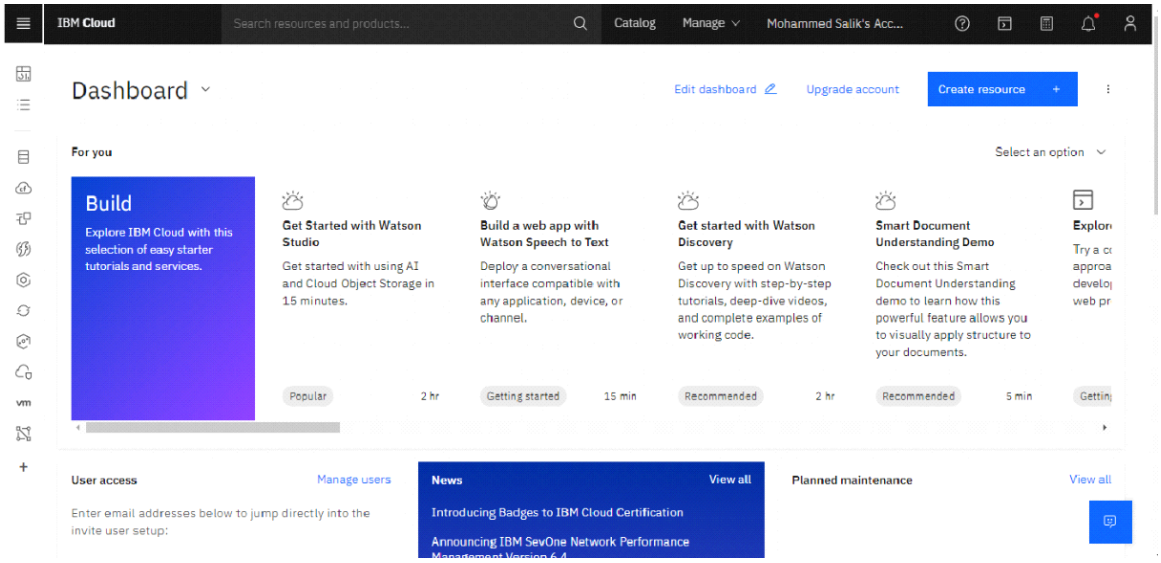
6.3 REPORTS FROM JIRA

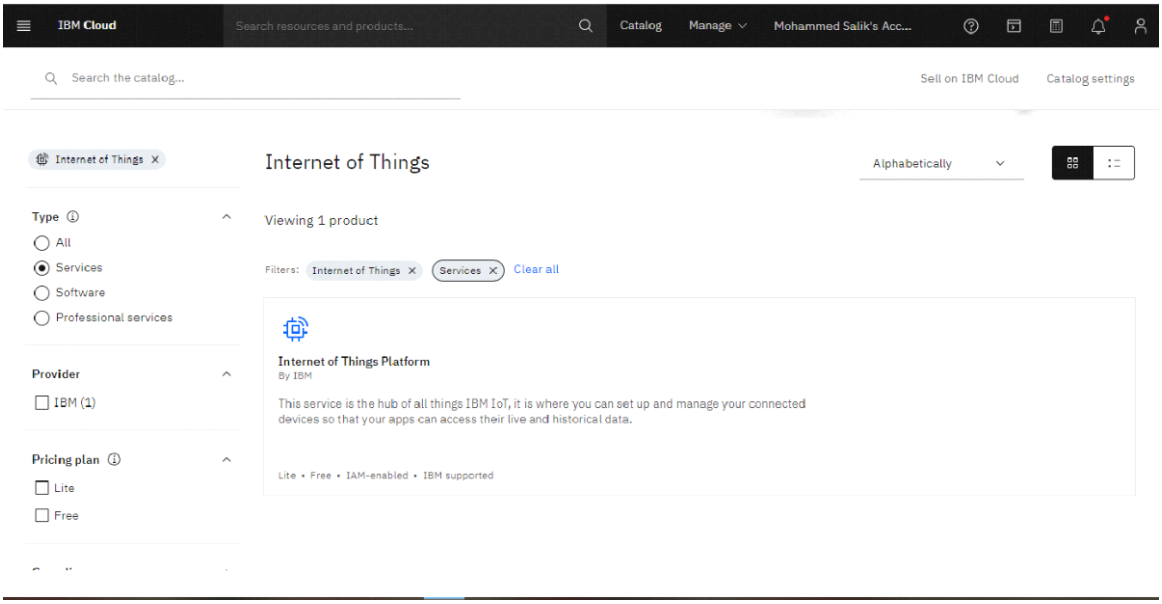


7.CODING AND SOLUTION

7.1 FEATURE 1

Creating IBM cloud service


IBM Cloud
Search resources and products...
Catalog
Manage
Mohammed Salik's Acc...
Dashboard
Edit dashboard
Upgrade account
Create resource
For you
Select an option
Build
Explore IBM Cloud with this selection of easy starter tutorials and services.
Get Started with Watson Studio
Get started with using AI and Cloud Object Storage in 15 minutes.
Popular
2 hr
Build a web app with Watson Speech to Text
Deploy a conversational interface compatible with any application, device, or channel.
Getting started
15 min
Get started with Watson Discovery
Get up to speed on Watson Discovery with step-by-step tutorials, deep-dive videos, and complete examples of working code.
Recommended
2 hr
Smart Document Understanding Demo
Check out this Smart Document Understanding demo to learn how this powerful feature allows you to visually apply structure to your documents.
Recommended
5 min
User access
Manage users
Enter email addresses below to jump directly into the invite user setup:
News
View all
Introducing Badges to IBM Cloud Certification
Announcing IBM SevOne Network Performance
Planned maintenance
View all


IBM Cloud
Search resources and products...
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Mohammed Salik's Acc...
Search the catalog...
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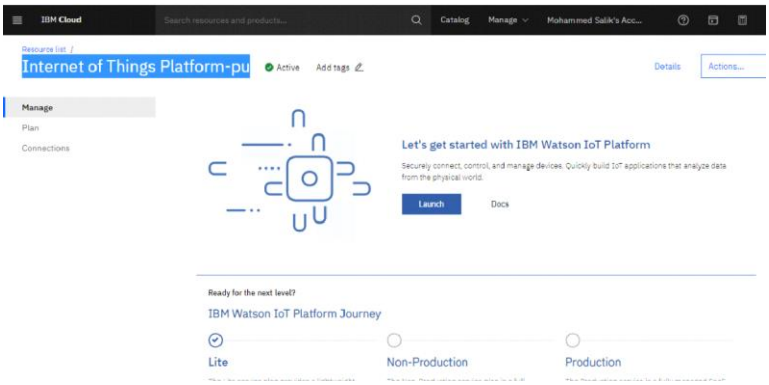
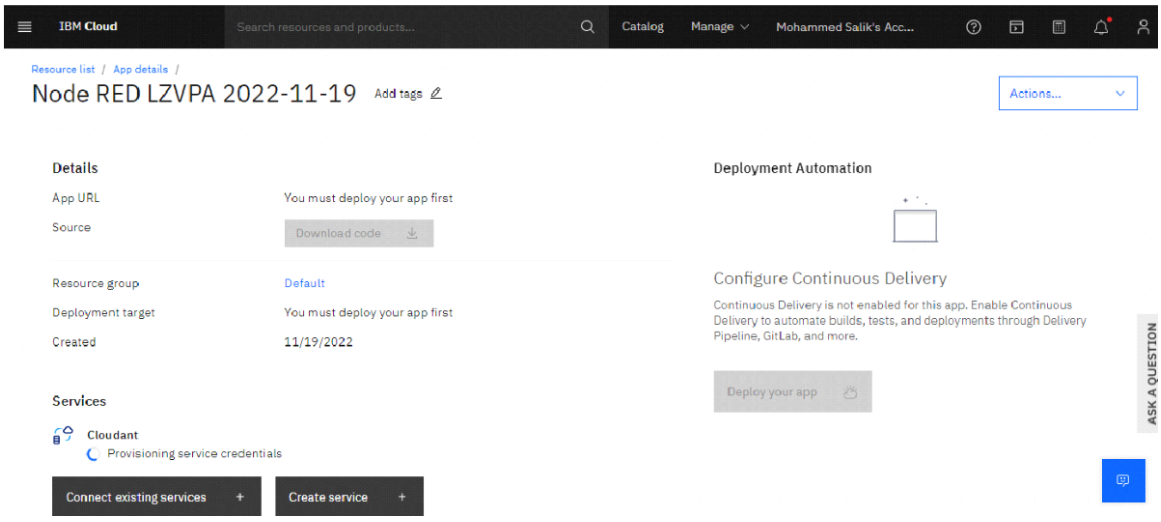
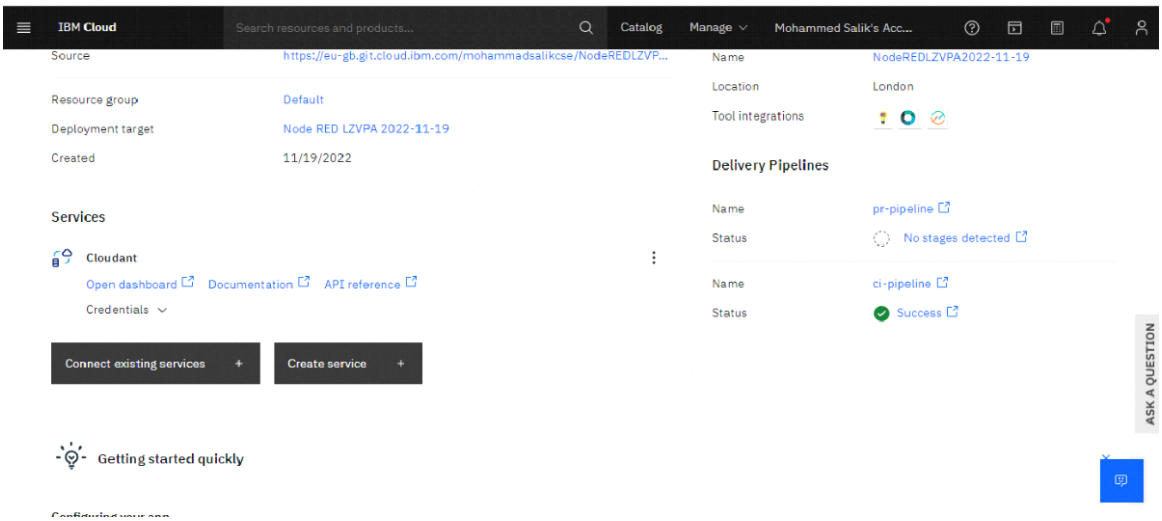
Internet of Things
Internet of Things
Alphabetically
Type
All
Services
Software
Professional services
Provider
IBM (1)
Pricing plan
Lite
Free
Viewing 1 product
Filters:
Internet of Things
Services
Clear all
Internet of Things Platform
By IBM
This service is the hub of all things IBM IoT, it is where you can set up and manage your connected devices so that your apps can access their live and historical data.
Lite • Free • IAM-enabled • IBM supported

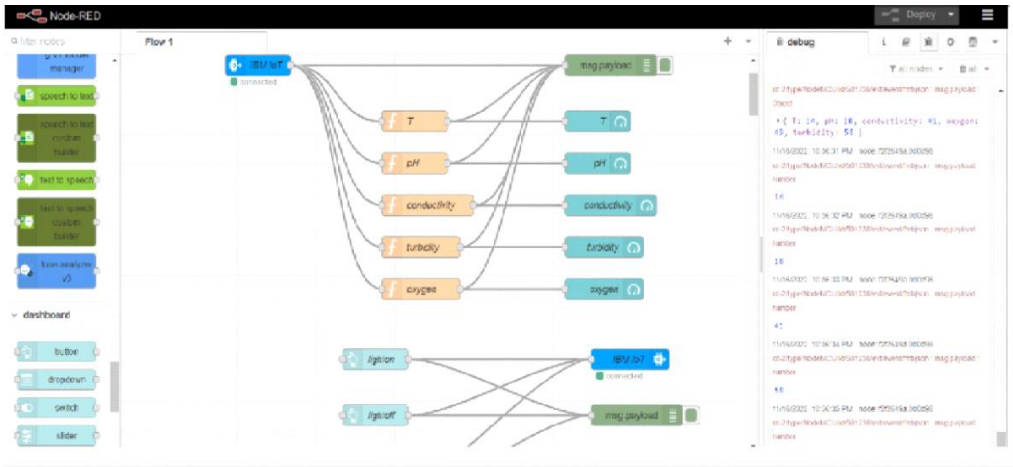

IBM Cloud
Internet of Things Platform-pu
Active
Add tags
Details
Actions...
Manage
Plan
Connections
Let's get started with IBM Watson IoT Platform
Launch
Docs
Ready for the next level?
IBM Watson IoT Platform Journey
Lite
Non-Production
Production

7.2. FEATURE 2

Node Red Service associated with IBM Cloud





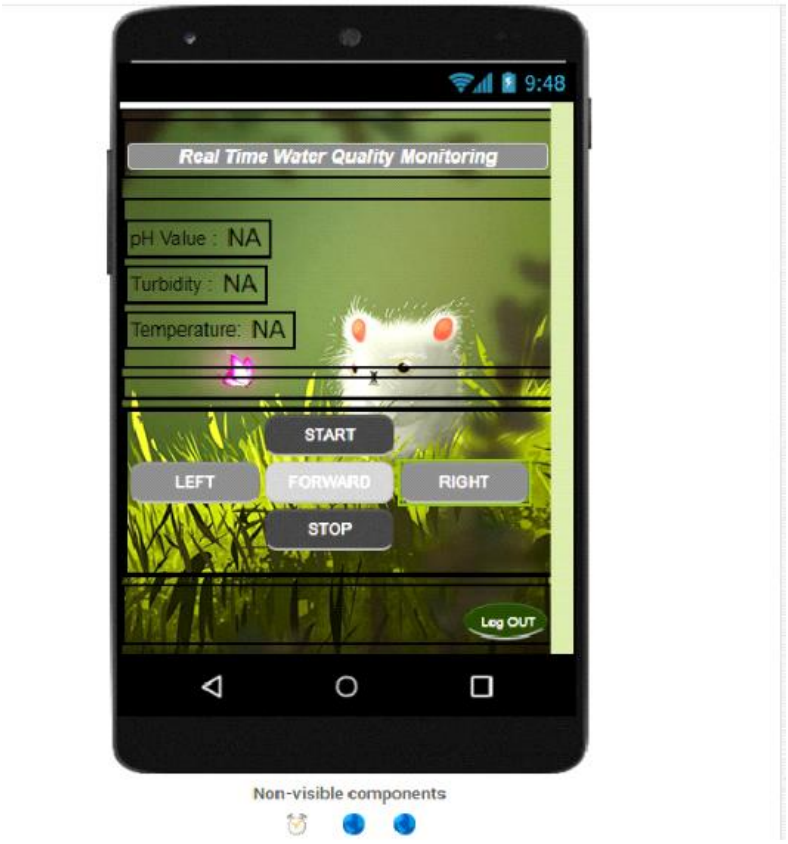


8.TESTING

8.1 TEST CASES

Section	Total Cases	Not tested	Fail	Pass
Print Engine	15	0	0	15
Cloud 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

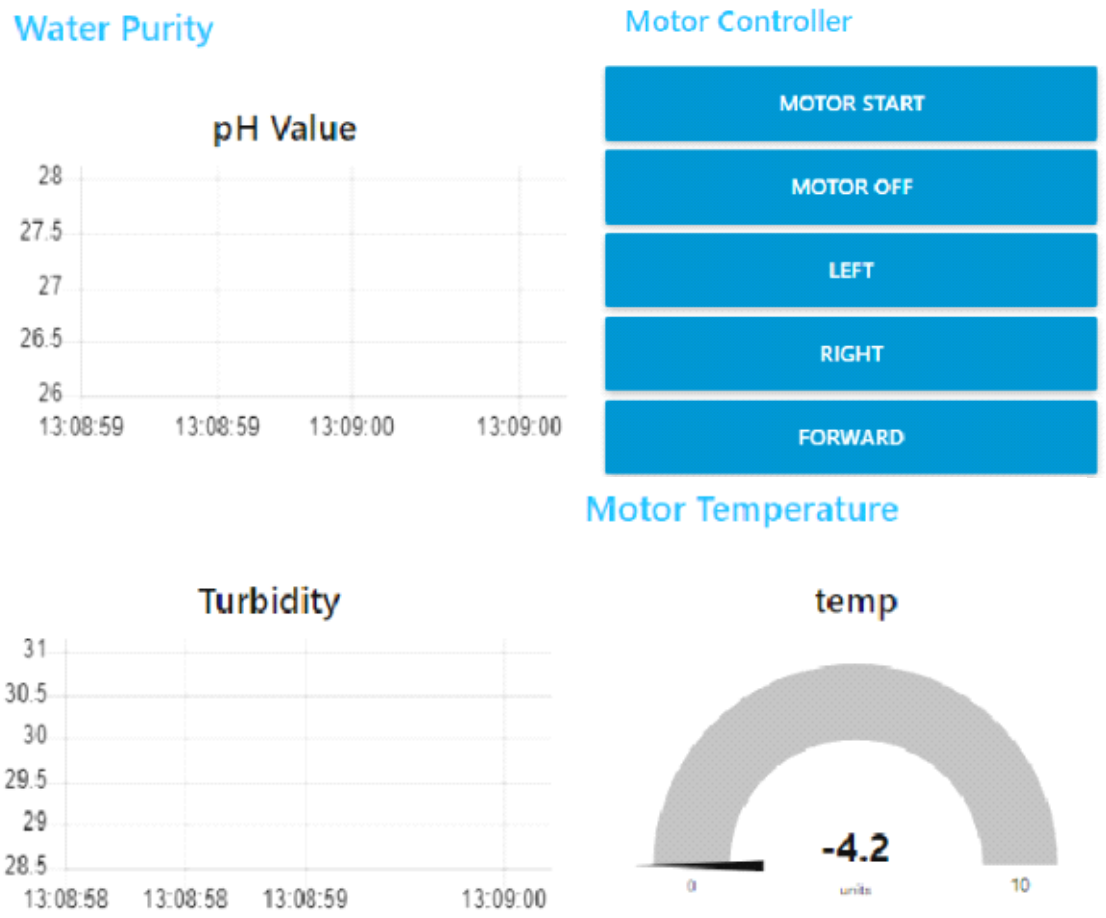


9.RESULTS

9.1 PERFORMANCE METRICES

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

10.1. ADVANTAGES

- The prototype created for maintaining water quality is excellent for preserving public health and also contributes to a clean environment.
- This water monitoring, cleaning, and control procedure is automated, which eliminates the need for manual work and saves time and money.
- The system's automation improves the effectiveness and efficiency of the control and monitoring processes. Remote control of the system is possible thanks to real-time mobile monitoring made possible by the Bluetooth module and Arduino interface on the PLC.
- Automation will speed up the process of checking the parameters.
- It is economically accessible to the average person.
- Offers protection against infections brought on by water.
- Measurement accuracy
- The user receives an SMS notice.

10.2. DISADVANTAGES

- The cost of analysis is very high
- It is challenging to collect water samples from every area of the water body.
- It takes time for lab testing and analysis.
- As a result, the results do not reflect real-time water quality measurements.
- The method is time-consuming and subject to a variety of human errors because manual data collection is done slowly from various locations around the water body.

11.CONCLUSION

A low-cost, simpler approach for monitoring water quality is also suggested. The implementation makes it possible for sensors to give customers online data. Algorithms for water quality anomaly detection can be added to the suggested setup to improve it. Therefore, the suggested system will undoubtedly benefit society's access to a reliable water supply. People will be greatly assisted in becoming aware of the dangers of using contaminated water and in stopping water pollution by realtime monitoring of water quality utilizing IoT integrated big data analytics.

Real-time river water quality monitoring is the main focus of the research. Because IoT integrated big data analytics can offer dependability, scalability, speed, and permanence, it appears to be a better solution. Real-time analytics tools including Spark streaming analysis through Spark ML lib, Deep learning neural network models, and the Belief Rule Based (BRB) system will all be thoroughly compared during the project development period.

12.FUTURE SCOPE

Therefore, IoT integrated big data analytics is appeared to be a better solution as reliability, scalability, speed, and persistence can be provided

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Therefore iot intehgr

Our usage of water detecting sensors provides a special benefit. Compared to a manual technique, it takes less time to check for contaminated levels and notifies the affected rate of water pollution instantly. Rural residents who live close to the river will be delighted with our suggestion. Monitoring water pollution in a certain location will be helpful. Consequently, this mechanism shields users from water pollution. It will be used to check the PH level, temperature, and water quality for agricultural purposes. This project will have a positive social impact on farmers as well.

This project can be scaled up to include more diverse types of sensors. The relay can be interfaced to allow us to regulate the water supply. We can use it as a revenue model as well.

Additionally, this technology might be used in a number of industrial procedures. To monitor data on computers, the system can be adjusted to suit the needs of the user.

13.APPENDIX

SOURCE CODE

SPRINT 1

CODE:

```
import wiotp.sdk.device
import os import time
import random
myConfig = {
   "identity": {
      "orgId": "12mn2r",
      "typeId": "QweRt",
      "deviceId":"938411"
   },
   "auth": {
      "token": "987654321"
   }
}
```

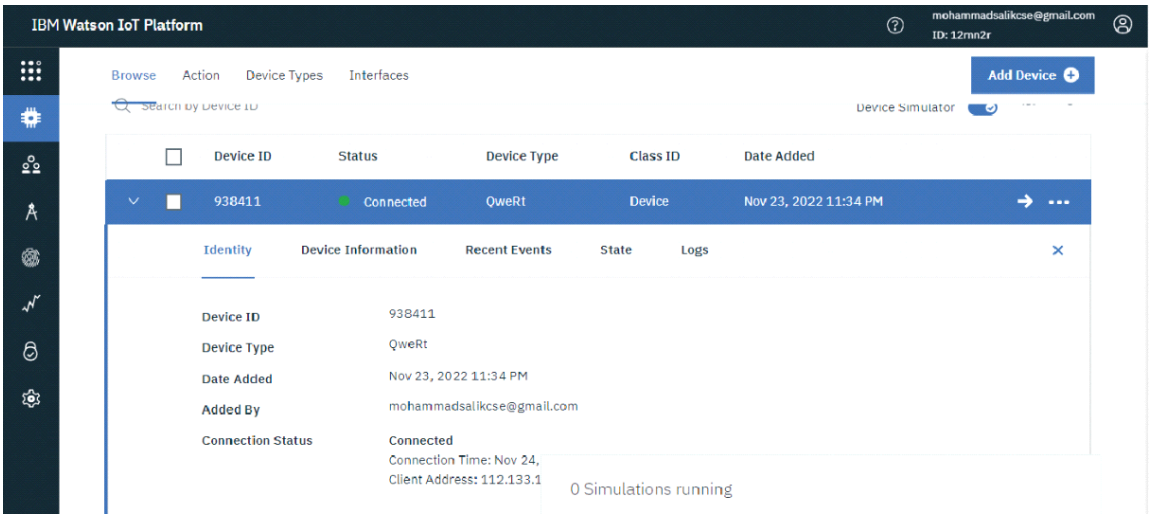
```
def myCommandCallback(cmd):
    print("Message received from IBM IoT Platform: %s" % cmd.data['command'])
m=cmd.data['command']

client = wiotp.sdk.device.DeviceClient(config=myConfig, logHandlers=None) client.connect()

while True:
    tur=random.randint(20,300)        tem=random.randint(0,100)        ph=random.randint(1,14)
myData={'temperature':tem, 'turbidity':tur, 'phvalue':ph}     client.publishEvent(eventId="status",
msgFormat="json",  data=myData,  qos=0,  onPublish=None)          print("Published  data
Successfully:  %s",  myData)          client.commandCallback  =  myCommandCallback
time.sleep(300)     client.disconnect()
```

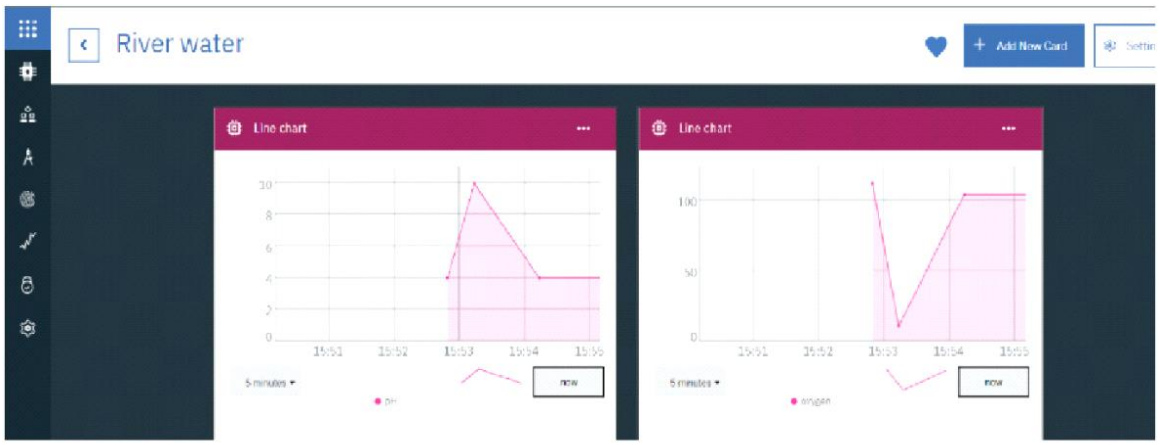
Output:

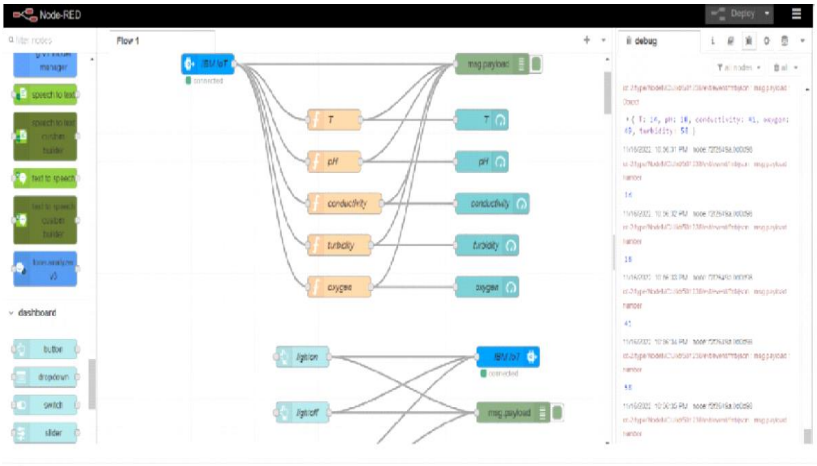
```
Published data {'T': 23, 'pH': 85, 'conductivity': 37, 'oxygen': 41, 'turbidity'
: 2} to IBM Watson
Published data {'T': 39, 'pH': 87, 'conductivity': 1, 'oxygen': 32, 'turbidity':
 84} to IBM Watson
Published data {'T': 90, 'pH': 89, 'conductivity': 29, 'oxygen': 65, 'turbidity'
: 93} to IBM Watson
Published data {'T': 91, 'pH': 15, 'conductivity': 0, 'oxygen': 27, 'turbidity':
 60} to IBM Watson
Published data {'T': 52, 'pH': 65, 'conductivity': 59, 'oxygen': 78, 'turbidity'
: 23} to IBM Watson
Published data {'T': 96, 'pH': 96, 'conductivity': 20, 'oxygen': 47, 'turbidity'
: 90} to IBM Watson
Published data {'T': 87, 'pH': 73, 'conductivity': 92, 'oxygen': 41, 'turbidity'
: 85} to IBM Watson
Published data {'T': 90, 'pH': 21, 'conductivity': 81, 'oxygen': 83, 'turbidity'
: 61} to IBM Watson
```

SPRINT 2

IBM WATSON

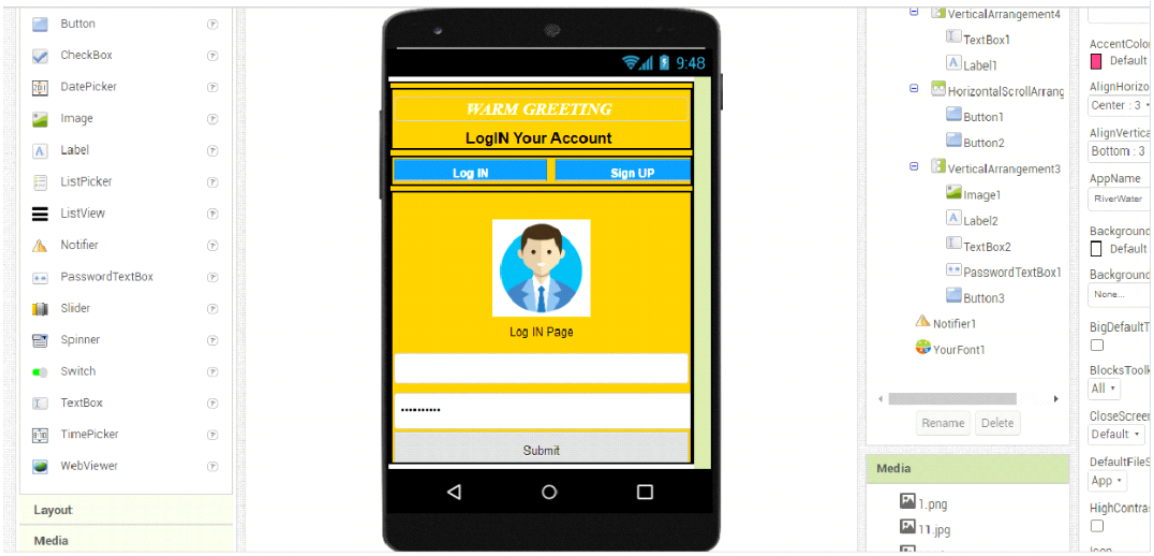


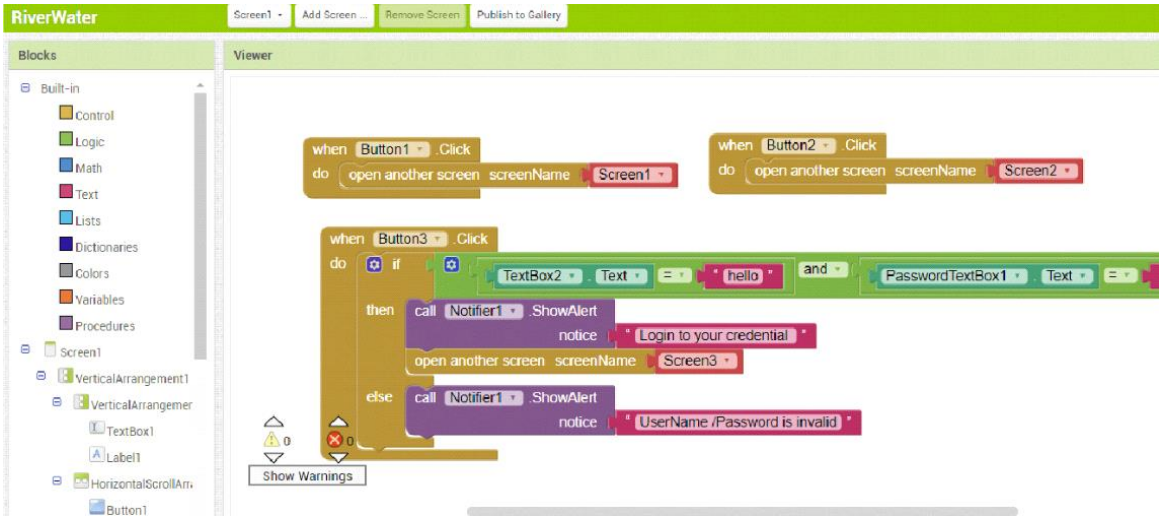




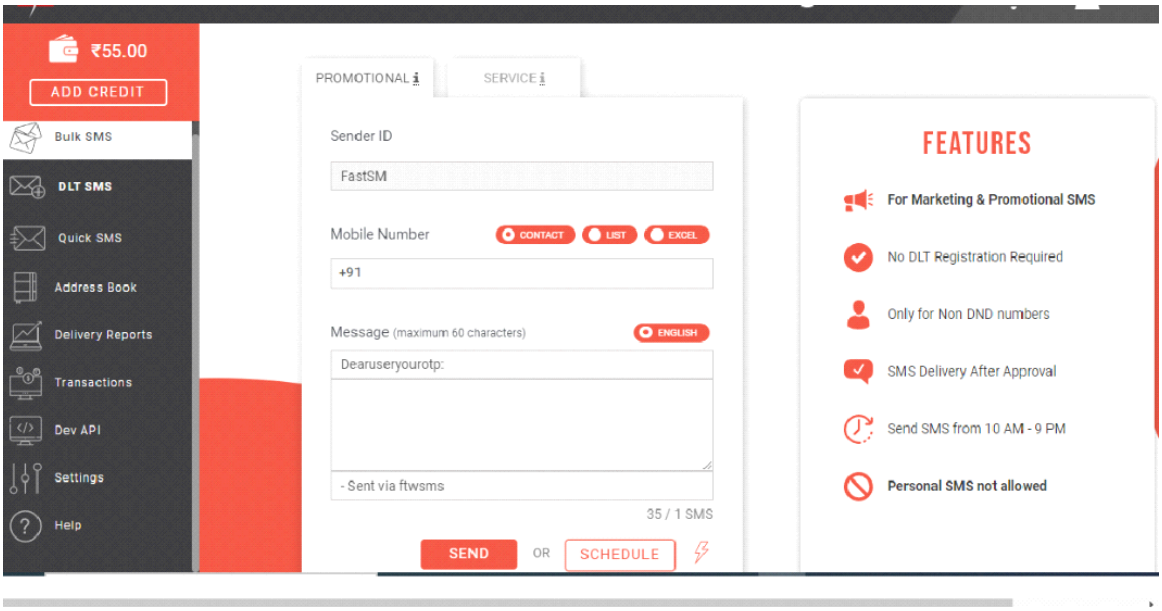
SPRINT 3

MIT APP INVENTOR




RiverWater
Screen1
Add Screen ...
Remove Screen
Publish to Gallery
Blocks
Viewer
Built-in
Control
Logic
Math
Text
Lists
Dictionaries
Colors
Variables
Procedures
Screen1
VerticalArrangement1
VerticalArrangemer
TextBox1
Label1
HorizontalScrollArr
Button1
when Button1 .Click
do open another screen screenName Screen1
when Button2 .Click
do open another screen screenName Screen2
when Button3 .Click
do if TextBox2 . Text = " hello " and PasswordTextBox1 . Text =
then call Notifier1 .ShowAlert
notice " Login to your credential "
open another screen screenName Screen3
else call Notifier1 .ShowAlert
notice " UserName /Password is invalid "
Show Warnings

SPRINT 4


₹55.00
ADD CREDIT
Bulk SMS
DLT SMS
Quick SMS
Address Book
Delivery Reports
Transactions
Dev API
Settings
Help
PROMOTIONAL
SERVICE
Sender ID
FastSM
Mobile Number
CONTACT
LIST
EXCEL
+91
Message (maximum 60 characters)
ENGLISH
Dearuseryourotp:
- Sent via ftwsms
35 / 1 SMS
SEND
OR
SCHEDULE
FEATURES
For Marketing & Promotional SMS
No DLT Registration Required
Only for Non DND numbers
SMS Delivery After Approval
Send SMS from 10 AM - 9 PM
Personal SMS not allowed

GITHUB LINK

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