PROJECT REPORT

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| Date | 18 November 2022 |
| Team ID | PNT2022TMID22772 |
| Project name | Real –time river water quality monitoring and control system |

INTRODUCTION

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* 1. PROJECT OVERVIEW

Current water quality monitoring system is a manual system with a monotonous process and is very time-consuming. This project 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.

* 1. PURPOSE

Monitoring **provides the objective evidence necessary to make sound decisions on managing water quality today and in the future**. Water-quality monitoring is used to alert us to current, ongoing, and emerging problems; to determine compliance with drinking water standards, and to protect other beneficial uses of water.

**INTRODUCTION**

Water pollution is a foremost global problem which needs ongoing evaluation and adaptation of water resource directorial principle at the levels of international down to individual wells. It has been studied that water pollution is the leading cause of mortalities and diseases worldwide. The records show that more than 14,000 people die daily worldwide due to water pollution. In many developing countries, dirty or contaminated water is being used for drinking without any proper prior treatment. One of the reasons for this happening is the ignorance of public and administration and the lack of water quality monitoring system which makes serious health issues. The design of Wireless Sensor Network (WSN) that assists to monitor the quality of water with the support of information sensed by the sensors dipped in water is depicted. 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. 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 population, monitor snow level, prevent landslide, and avalanche etc. Moreover, it can be implemented in the field of water quality monitoring and controlling system. Water quality monitoring has gained more interest among researchers in this twenty-first century.

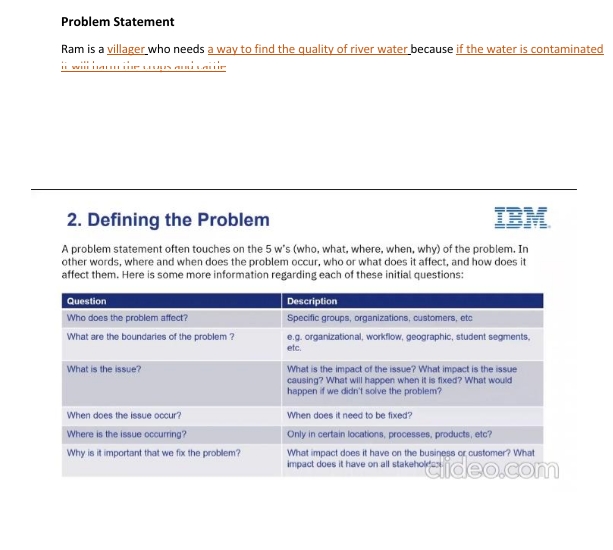
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**PROPOSED METHOD**

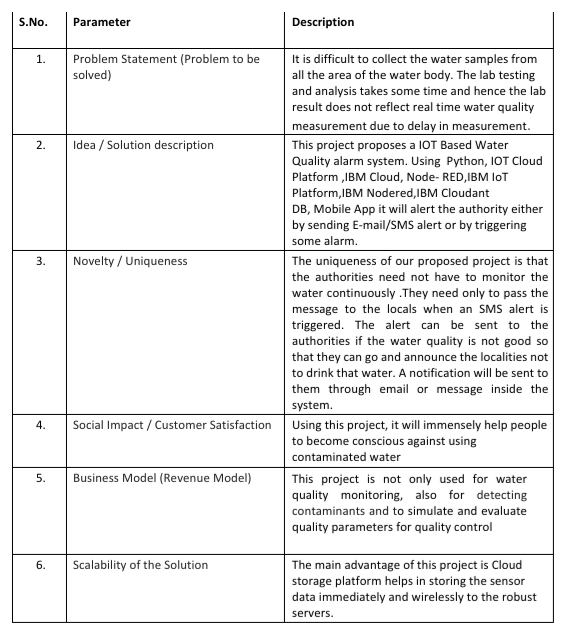
Current water quality monitoring system is a manual system with a monotonous process and is very time-consuming. This project proposes a sensor – based water Quality monitoring system. The main components of Wireless Sensor Network(WSN)include a microcontroller for processing the system, communication 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 population to become conscious against contaminated water as well as to stop polluting the water.

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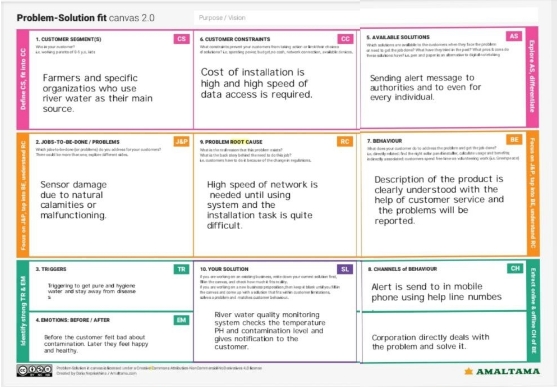
2.3 PROBLEM STATEMENT DEFINITION



3.3 PROPOSED SOLUTION

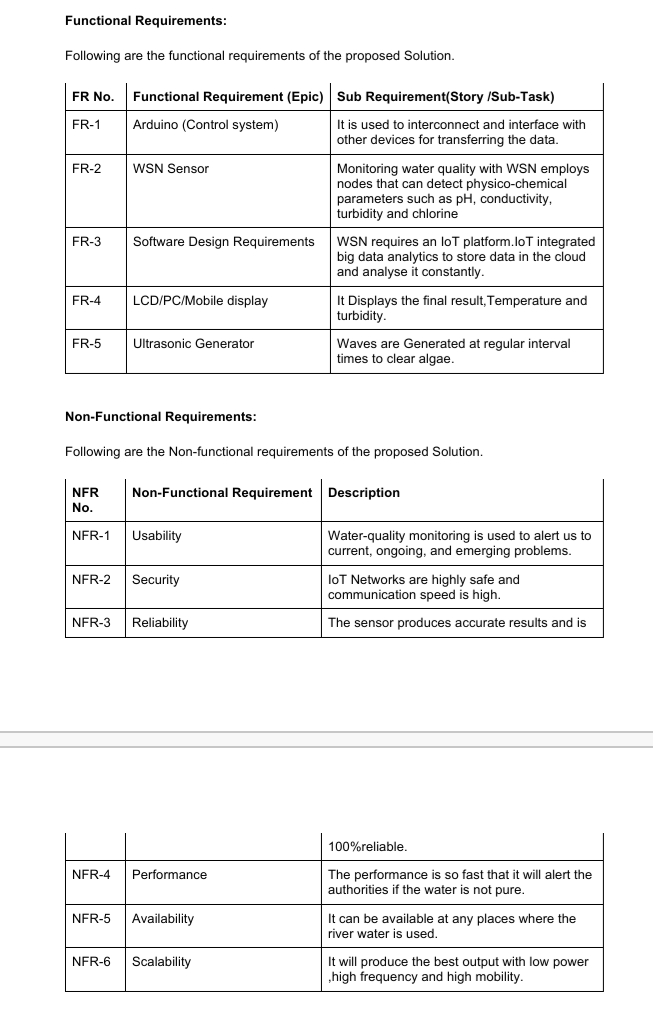


3.4 PROBLEM SOLUTION FIT



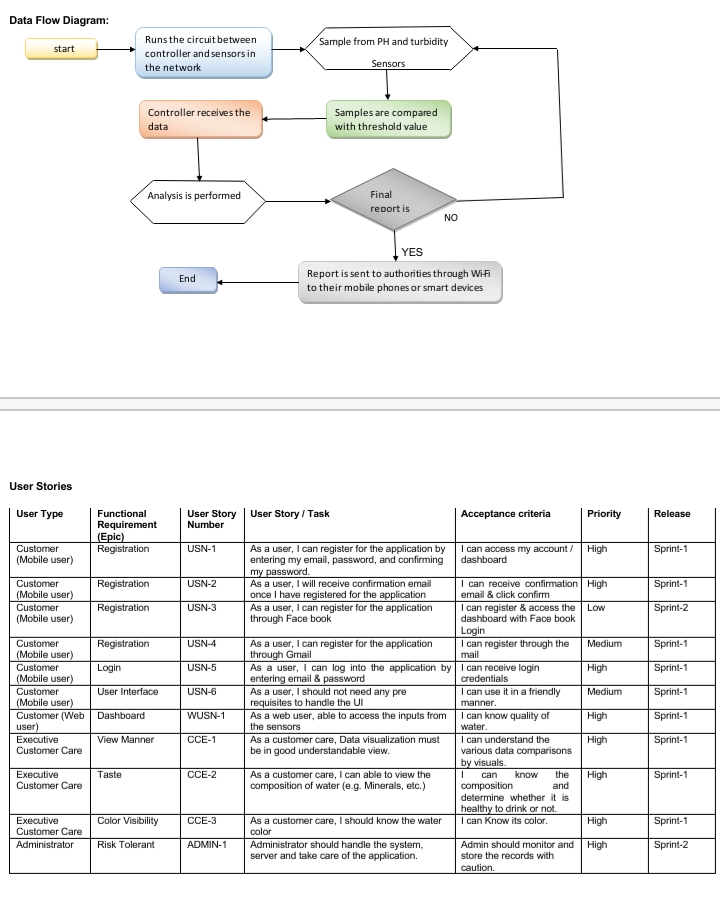
4. REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS & 4.2 NON - FUNCTIONAL REQUIREMENTS



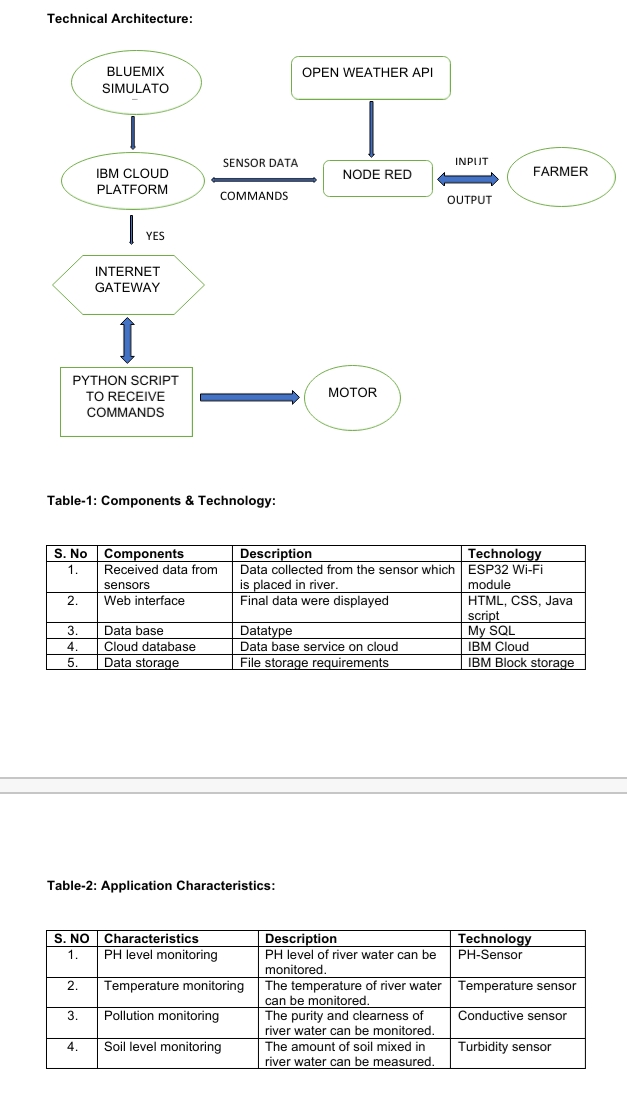
5. PROJECT DESIGN

5.1 DATA FLOW DIAGRAMS



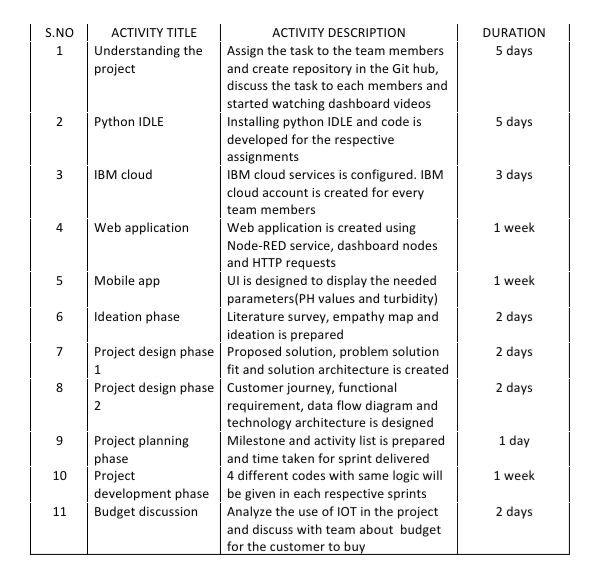
5.2 SOLUTIONS & TECHNICAL ARCHITECTURE

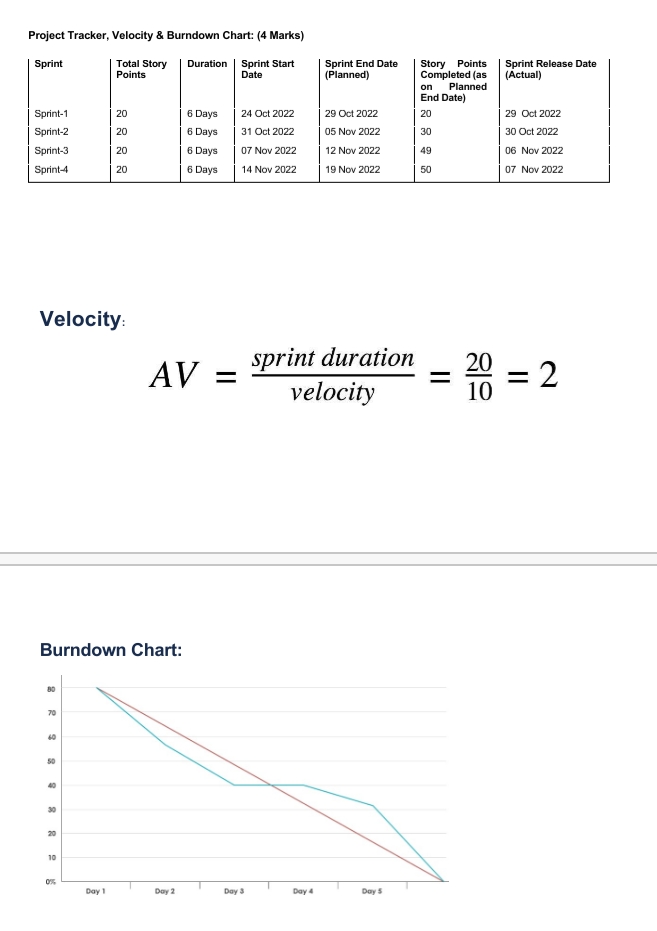
TECHNOLOGY ARCHITECTURE



6. PROJECT PLANNING & SCHEDULING

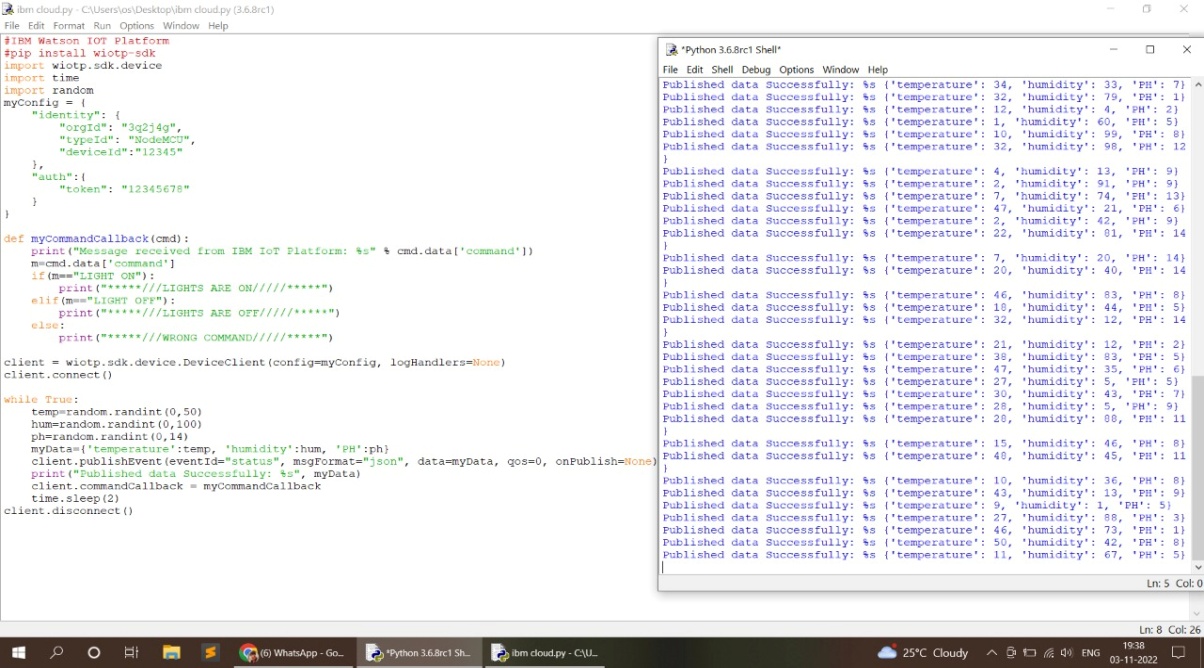
6.1 SPRINT PLANNING &ESTIMATION & 6.2 SPRINT DELIVERY SCHEDULE

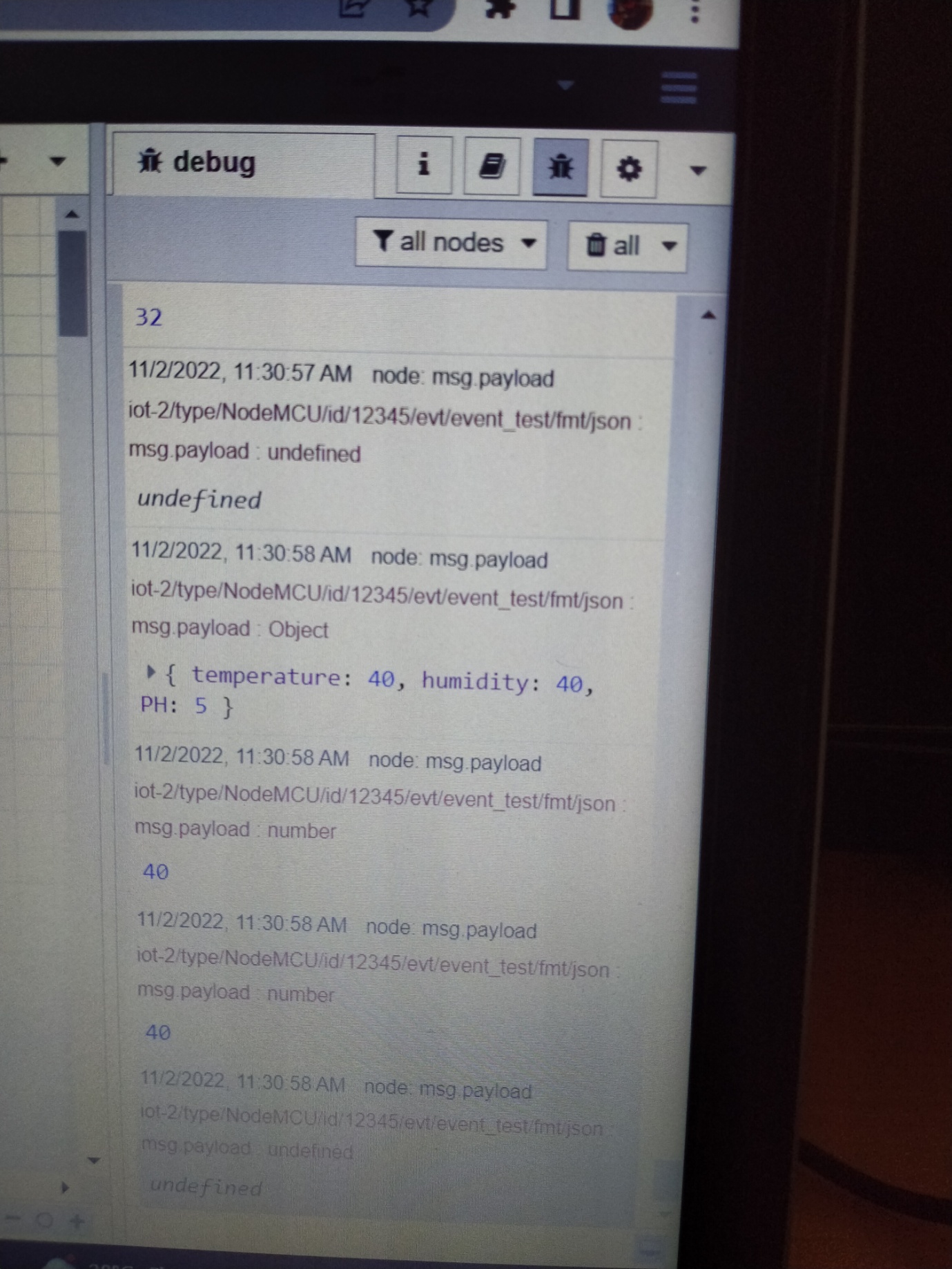




7. CODING AND SOLUTIONING

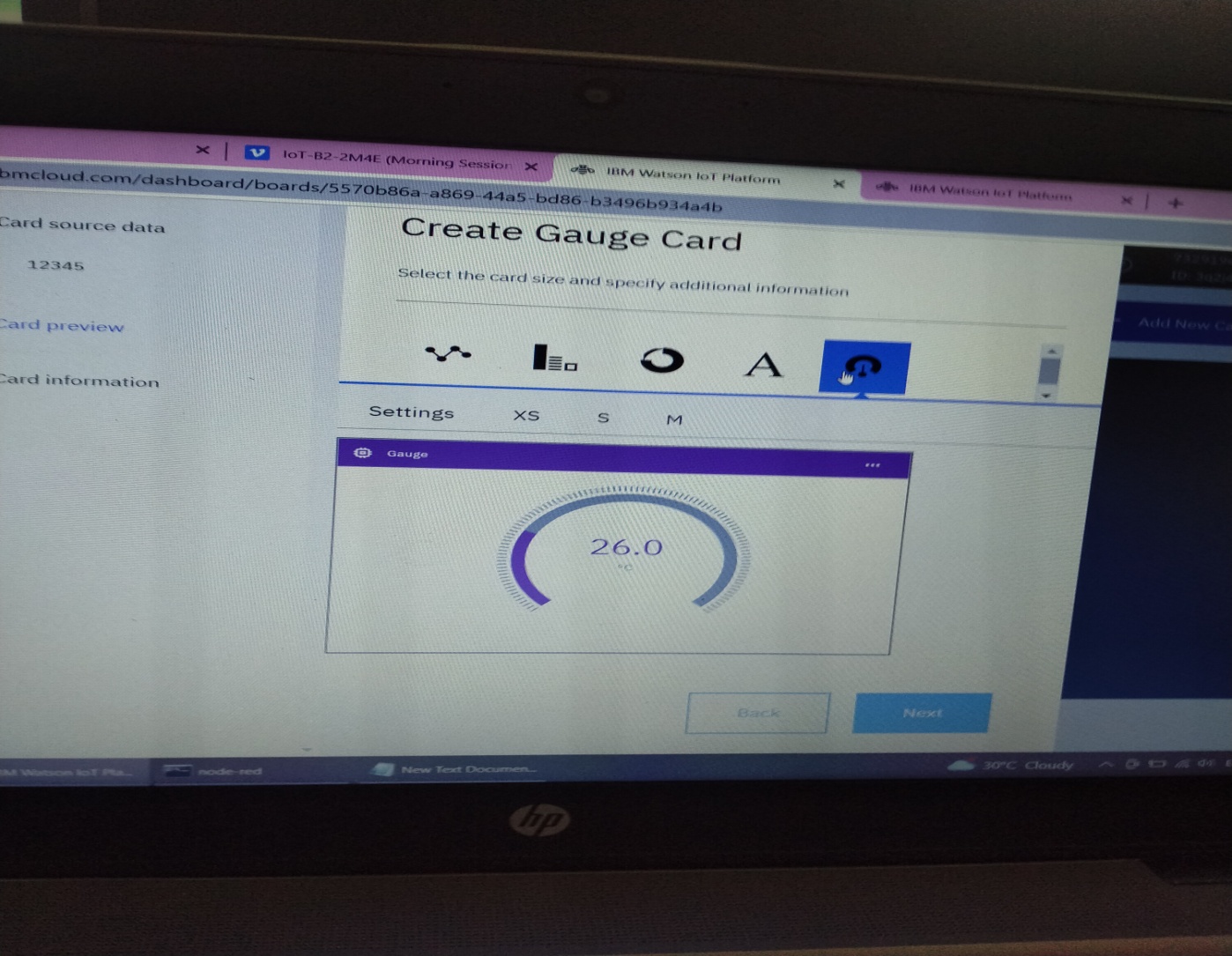
7.1 FEATURE 1

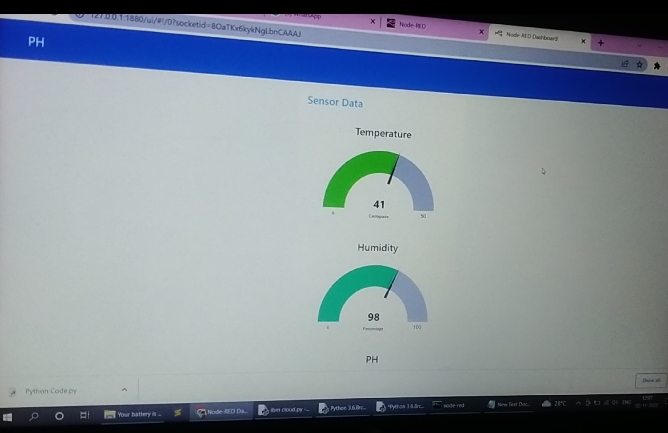


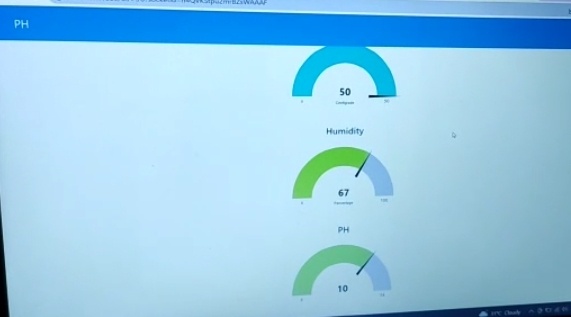


8.2 USER ACCEPTANCE TESTING



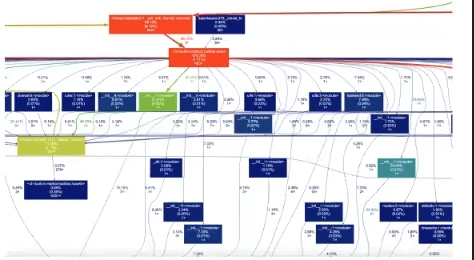






9. RESULT

9.1 PERFORMANCE METRICS



10. ADVANTAGES & DISADVANTAGES

Advantages are **more user friendly, efficient**. Drawback is high cost for smart sensors. In this system uses wireless sensors for monitoring quality of water parameters monitored are ph, turbidity, conductivity, temperature. A micro controller has the task of signal digitalizing, data transmission, network management.

This sleek and easily portable water quality meter can give you **accurate measurements on pH, total dissolved salts, electrical conductivity and the temperature of your water**.

11. CONCLUSION & 12. FUTURE SCOPE

Real-time monitoring of water quality by using IoT integrated Big Data Analytics will immensely help people to become conscious against using contaminated water as well as to stop polluting the water. The research is conducted focusing on monitoring river water quality in real-time. Therefore, IoT integrated big data analytics is appeared to be a better solution as reliability, scalability, speed, and persistence can be provided. During the project development phase an intense comparative analysis of real-time analytics technologies such as Spark streaming analysis through Spark MLlib, Deep learning neural network models, and Belief Rule Based (BRB) system will be conducted. This research would recommend conducting systematic experimentation of the proposed technologies in diverse qualities of river water in Bangladesh. Due to the limitation of the budget, we only focus on measuring the quality of river water parameters. This project can be extended into an efficient water management system of a local area. Moreover, other parameters which wasn’t the scope of this project such as total dissolved solid, chemical oxygen demand and dissolved oxygen can also be quantified. So the additional budget is required for further improvement of the overall system.

13. APPENDIX

SOURCE CODE:

#IBM Watson IOT Platform

#pip install wiotp-sdk

import wiotp.sdk.device

import time

import random

myConfig = {

    "identity": {

        "orgId": "3q2j4g",

        "typeId": "NodeMCU",

        "deviceId":"12345"

    },

    "auth":{

        "token": "12345678"

    }

}

def myCommandCallback(cmd):

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

    m=cmd.data['command']

    if(m=="LIGHT ON"):

        print("\*\*\*\*\*///LIGHTS ARE ON/////\*\*\*\*\*")

    elif(m=="LIGHT OFF"):

        print("\*\*\*\*\*///LIGHTS ARE OFF/////\*\*\*\*\*")

    else:

        print("\*\*\*\*\*///WRONG COMMAND/////\*\*\*\*\*")

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

client.connect()

while True:

    temp=random.randint(0,50)

    hum=random.randint(0,100)

    ph=random.randint(0,14)

    myData={'temperature':temp, 'humidity':hum, 'PH':ph}

    client.publishEvent(eventId="status", msgFormat="json", data=myData, qos=0, onPublish=None)

    print("Published data Successfully: %s", myData)

    client.commandCallback = myCommandCallback

    time.sleep(2)

client.disconnect()

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