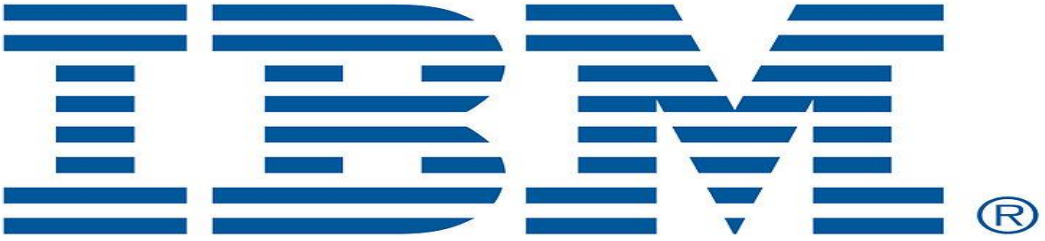

REAL TIME RIVER WATER QUALITY MONITERING SYSTEM

A PROJECT REPORT

Submitted by

TEAM ID : PNT2022TMID19033

TEAM SIZE : 4

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1 . INTRODUCTION

1.1 .PROJECT OVERVIEW

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 system consists of several sensors which is used to measure physical and chemical parameters of the water. 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. 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 populations to become conscious against contaminated water as well as to stop polluting the water.

1.2 . PURPOSE

The environment around consists of five key elements e.g., soil, water, climate, natural vegetation, and landforms. Among these water is the utmost crucial element for human life. It is also vital for the persistence of other living habitats . Whether it is used for drinking, domestic use, and food production or recreational purposes, safe and readily available water is the need for public health . So it is highly imperative for us to maintain water quality balance. Otherwise, it would severely damage the health of the humans and at the same time affect the ecological balance among other species . 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 .

In this paper, 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 if 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 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. 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 . In this research, we monitor the physical and chemical parameters of water bodies inside by using an IoT based sensor network.The pH of thing is a useful constant to display because graduate and low pH levels can hump large effects on the author. The pH of a statement can grasp from 1 to 14. A pH sensor is an instrumentation that measures the hydrogen-ion density in a bleach, indicating its tartness or alkalinity. Its constitute varies from 0 to 14 pH. Uttermost pH values also process the solubility of elements and compounds 1. The environment around consists of five key elements e.g., soil, water, climate, natural vegetation, and landforms. Among these water is the utmost crucial element for human life. It is also vital for the persistence of other living habitats . Whether it is used for drinking, domestic use, and food production or recreational purposes, safe and readily available water is the need for public health . So it is highly imperative for us to maintain water quality balance. Otherwise, it would severely damage the health of the humans and at the same time affect the ecological balance among other species .

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Related works:

To design a good quality model, we reviewed out different existing system developed by researchers. Different authors have proposed distinguished models to check water quality by analyzing the parameters such as temperature, pH and conductivity, and so on. By considering all these points, we designed a smart water monitoring system which can perform all these monitoring functions. Stephen Brosnan investigated a WSN to collect real time water quality parameters (WQP). Quio Tie-Zhn, developed online water quality monitoring system based on GPRS/GSM . The information was sent by means of GPRS network, which helped to check remotely the WQP. Kamal Alameh presented web based WSN for monitoring water pollution using ZigBee and WiMAX networks. The system collected, processed measured data from sensors, and directed through ZigBee gateway to the web server by means of WiMAX network to monitor quality of water from large distances in real time. Dong He developed WQM system based on WSN. The remote sensor was based on ZigBee network. WSN tested WQP and sent data to Internet using GPRS. With the help of Web, information was gathered at remote server. Vijayakumar et al., designed a low cost system design for real time water quality monitoring in IoT utilizes sensors to check many important physical and chemical parameters of water . The parameters such as turbidity, temperature, pH, dissolved oxygen conductivity of water can be measured. In our project, we proposed a water quality monitoring system based on IoT. Mohammad Salah Uddin Chowdury et al. / Procedia Computer Science 00 (2019) 000–000 3

2. LITERATURE SURVEY

2.1 Existing problem:

Central Water Commission (CWC) monitors water quality, by collecting samples from representative locations within the processing & distribution system. These samples are analyzed at the well-equipped laboratories. At these laboratories samples from raw water, filter water and treated water are taken for analysis. The estimation of water parameters like turbidity, pH, dissolved oxygen, etc. is done with the help of meters.

So the disadvantages of this existing system are that; there is no continuous and remote monitoring, human resource is required, less reliable, no monitoring at the source of waters i.e. no on field monitoring and the frequency of testing is very low. Due to these disadvantages of the existing system it is required to develop a system that will allow real time and continuous monitoring of water quality. Thus various advanced technologies for monitoring water quality have been proposed in the recent years. In the structure of the wireless sensor networking in which a number of sensor nodes are located in a lake is proposed. A much smaller number of UAVs also watch the lake and they are controlled by the central monitoring station (CMS). The sensor nodes and UAVs are both movable whereas the CMS is fixed. The CMS collects the information from the sensors and process them. In a framework for monitoring water quality by incorporating bacterial contamination of water for open water bodies using WSN (consisting of sensors for sensing parameters of interest), UV Light to probe the contamination of water and Fluorescence as a monitoring tool is proposed. Presents a web based wireless sensor network, for monitoring water pollution by means of Zigbee and WiMax technologies. This system would have a local Zigbee network that will be capable of measuring various water quality parameters, a WiMax network and web based monitoring with the help of a controlling computer. The system is intended to collect and process information, thus making decisions in real time via a remote web server. The data is directed through the Zigbee gateway from sensor nodes to the web server by means of a WiMax network, thus permitting users to distantly monitor the water quality from their place instead of gathering data from the scene. Experimental results reveals that the system is capable of monitoring water pollution in real time.

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- K. Andersson and M. S. Hossain, "Smart Risk Assessment Systems using Belief-rule-based DSS and WSN Technologies", in 2014 4th International Conference on Wireless Communications, Vehicular Technology, Information Theory and Aerospace and Electronic Systems, VITAE 2014 : Co-located with Global Wireless Summit, Aalborg, Denmark 11-14 May 2014, 2014.

- Water quality monitoring using wireless sensor networks: Current trends and future research directions
  ACM Transactions on Sensor Networks (TOSN),vol., 13 (2017), p. 4

2.3 PROBLEM STATEMENT DEFINITION:

Due to the fast growing urbanization supply of safe drinking water is a challenge for the every city authority. Water can be polluted any time. So the water we reserved in the water tank at our roof top or basement in our society or apartment may not be safe. Still in India most of the people use simple water purifier that is not enough to get surety of pure water. Sometimes the water has dangerous particles or chemical mixed and general purpose water purifier cannot purify that. And it’s impossible to check the quality of water manually in every time. So an automatic real-time monitoring system is required to monitor the health of the water reserved in our water tank of the society or apartment. So it can warn us automatically if there is any problem with the reserved water. And we can check the quality of the water anytime and from anywhere. By keeping this mind we designed this system especially for residential areas.

3.IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas:

3.2 Ideation & Brainstroming:

Following are the aims of idea implementation

(a) To measure water parameters such as pH, dissolved oxygen, turbidity, conductivity, etc. using available sensors at a remote place.

(b) To assemble data from various sensor nodes and send it to the base station by the wireless channel.

(c) To simulate and evaluate quality parameters for quality control.

(d) To send SMS to an authorized person routinely when water quality detected does not match the preset standards, so that, necessary actions can be taken. The detailed scheme of a water quality monitoring system. Full scheme of the system.

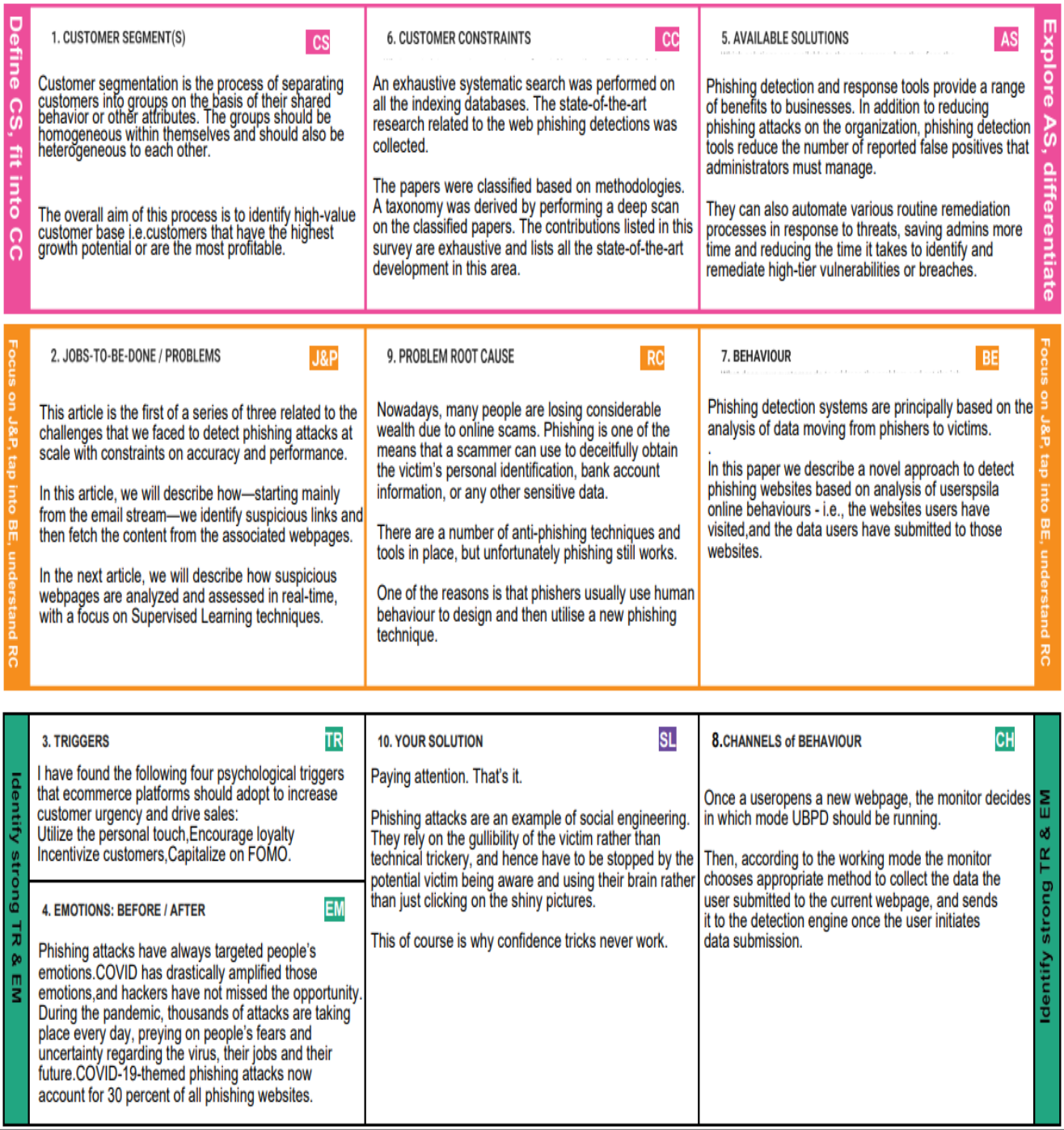
In the proposed architecture, each water reservoir will be attached with a sensor node equipped with a set of sensor probes capable of measuring the parameters like pH, turbidity etc. According to the specifications of the sensor probes and the processor board of the sensor the signal conditioning circuit will be designed to generate the sensor output to the processor board through Analog to Digital Converter. The processor board processes the data according to the quality specifications and transmits to the central server through the transceiver.

The measured data in each of the reservoir shall be sent to the central server through the respective transceivers either directly or indirectly through other sensor or repeater nodes. Control surface An Arduino mega is utilized as a core person. The Arduino victimized here is mega 2560 because multiple analog sign sensors probe requisite to be conterminous with the Arduino inhabit. It has a set of registers that use as a solon use RAM. Specific intend to know registers for on-chip component resources are also mapped into the assemblage grapheme. The addressability of store varies depending on instrumentation series and all PIC devices someone several banking mechanisms to utilise addressing to additional faculty. Subsequent series of devices have move instructions which can covert move had to be achieved via the register. Thus the mechanism functions with the exploit of coding intrinsically in the Arduino UNO R3 skate. Sensors for monitoring. pH sensor The pH of thing is a useful constant to display because graduate and low pH levels can hump large effects on the author.

3. 3 Proposed solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	IOT Based Real Time River Water Quality Monitoring and Control System
2.	Idea / Solution description	1. To monitor the quality of water using sensors like temperature, potentiometer(pH), turbidity, salinity and so on. 2.Collecting those data and storing it in cloud and perform analyse to check if the water is contaminated or not for drinking. 3.If the water is contaminated an alert is made to the user/ local authority through SMS or can be viewed through web application anytime.
3.	Novelty / Uniqueness	1.Based on the collected data prediction is made whether the water can be used for cultivation of specific crops and suitable for the aquatic animals.
4.	Social Impact / Customer Satisfaction	Algal growth, fertilizers, pesticides cause river pollution which can impact all living beings. Better monitoring and control measures can impact health and vegetation massively.
5.	Business Model (Revenue Model)	Service based product is developed to serve the local people to know the quality of water before consuming it or using it for any purpose. This prevents health issues or at most loss of living.

3.4 Problem solution fit:



4.REQUIREMENT ANALYSIS

4.1 Functional requirement:

Following are the functional requirements of the proposed solution

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / sub-Task)
FR-1	Arduino(control system)	Sensors are interfaced to Arduino and it collects measurements data periodically from sensors.
FR-2	WSN Sensor	Multiple sensor nodes installed for the detection of pH, temperature, dust particles, turbidity.
FR-3	Software Design Requirements	WSN requires IoT platform which requires Neural Network Model to classify water quality as Good Or Bad. IoT integrated big data analytics to store data in cloud and analyze it constantly
FR-4	LCD/PC/Mobile display	Displays the resulting sensed pH, temperature, turbidity. If ,acquired value > Threshold value, then comment=BAD. If, acquired value < Threshold value, then comment=GOOD.

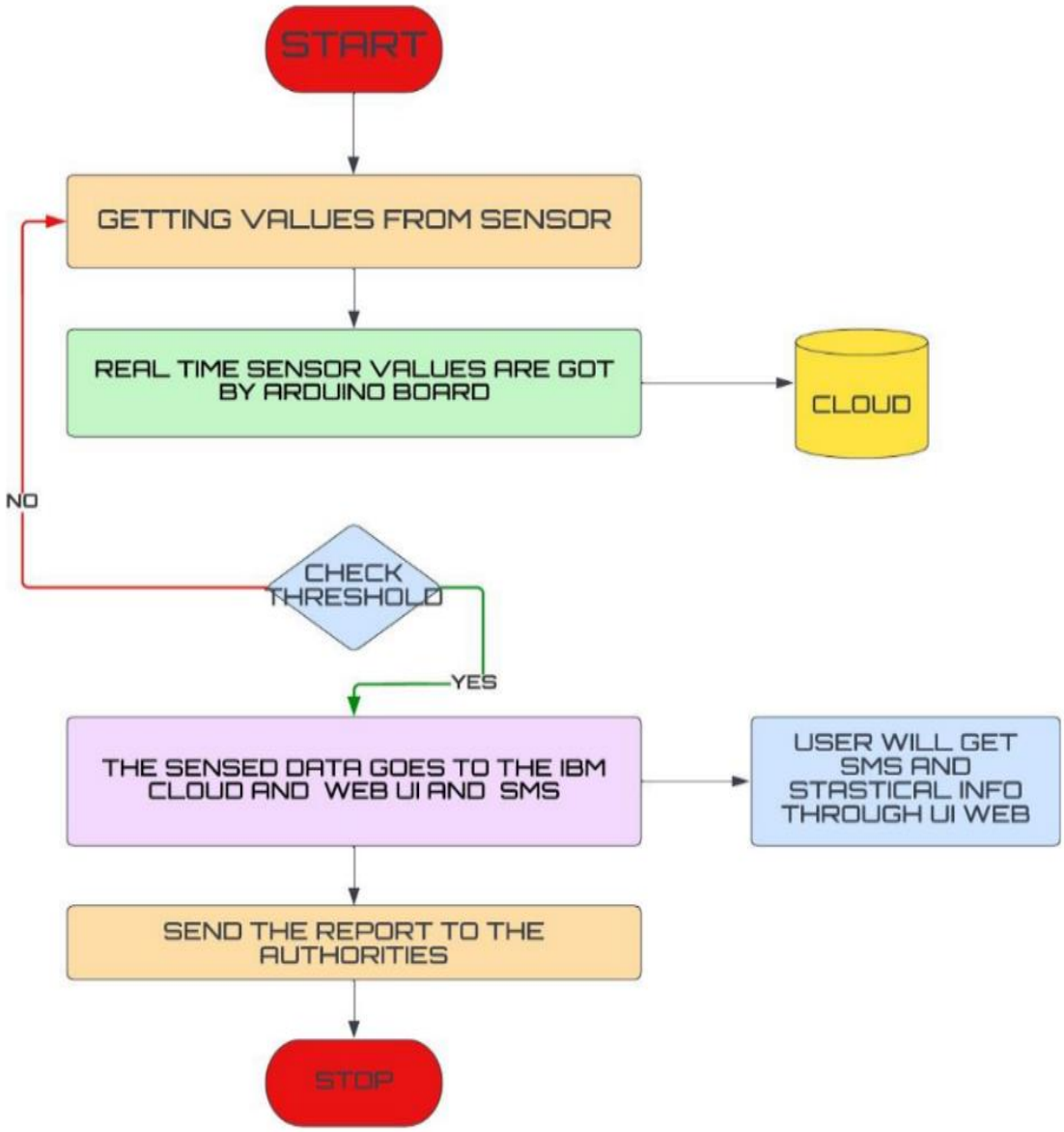
4.2 Non-functional Requirements:

Following are the non-functional requirements of the proposed solution

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	It is important to monitor water quality to ensure that, it is safe for humans to drink it as well as for wild life and marine life and to understand environmental impacts and to not harm sea life.
NFR-2	Security	The IoT networks are incredibly safe and communication speed is also high. The technology comfortably resolves all the issues.
NFR-3	Reliability	The water quality and monitoring system is reliable and it's output can be assured. Since standardized hardware components and software designs are used.
NFR-4	Performance	Real-time quality of water is executed and alertring the authorities if water quality is not good.
NFR-5	Availability	The monitoring system is made available for use at any time with accuracy.
NFR-6	Scalability	The system with high frequency, high mobility and low powered and cost-effective.

5.PROJECT DESIGN

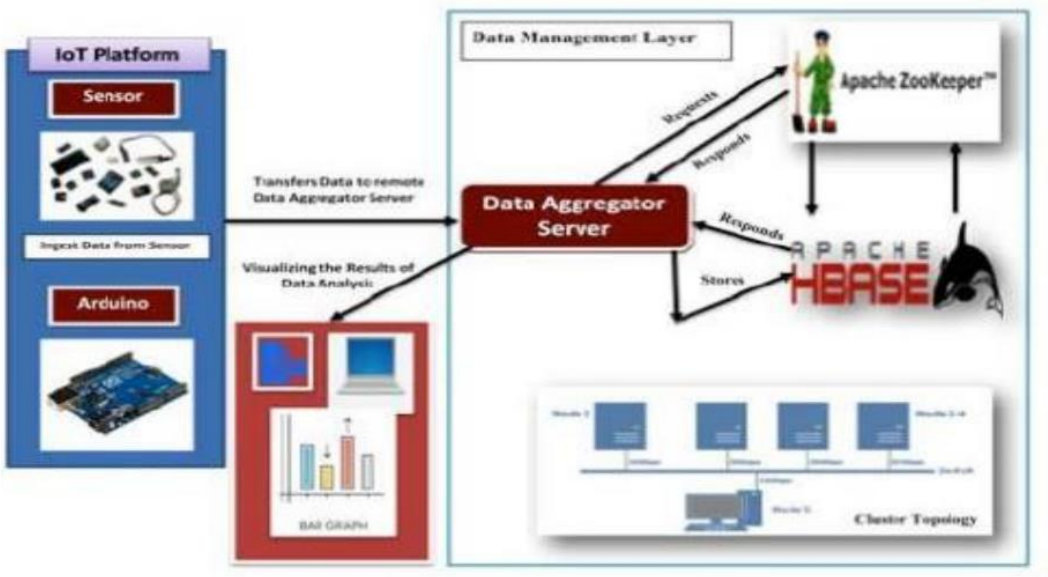
5.1 Data flow diagrams:



5.2 Solution & Technical Architecture:

Solution Architecture:

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:



- Arduino MegaBoard.

Arduino is an open-source electronics prototyping platform based on flexible, easy-touse hardware and software. Its intended for artists, designers, hobbyists, and anyone interested in creating interactive objects or environments. Or more simply, you load on some code and it can read sensors, perform actions based on inputs from buttons, control motors, and accept shields to further expand its capabilities. Really, you can do almost anything. All Arduino boards have one thing in common: they are programmed through the Arduino IDE. This is the software that allows you to write and upload code. Beyond that, there can be a lot of differences. The number of inputs and outputs (how many sensors, LEDs,

and buttons you can use on a single board), speed, operating voltage, and form factor are just a few of the variables. Some boards are designed to be embedded and have no programming interface (hardware) which you would need to buy separately. Some can run directly from a 3.7V battery, others need at least 5V. Check the chart on the next page to find the right Arduino for your project.

Fig 2 :Ardino mega board

• Liquid-crystal display (LCD): It is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in color or monochrome.[1] LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as preset words, digits, and seven- segment displays, as in a digital clock.

• The Temperature and PH sensor.

To measure the temperature of a water tank and log it via the Arduino. The idea is to maintain the temperature of the water at 25-30C at all times. I've noticed that most applications have used a sensor such as DS18S20 or TMP35/TMP36/TMP37.

but since my application requires to measure the temperature in water, I think a more suitable sensor should have a waterproof probe (or external probe). The usual way is to contain the water inside a tank / container which can transmit heat – usually metal. To the outside of this is then bonded the temperature sensor – be that a simple bi- metallic strip thermostat, or a more complex temperature sensing transducer. Of course, this requires a metal tank, and that will radiate heat, which will be wasteful. Ideally you would want some form of waterproof probe. You haven't mentioned the amount of water you're dealing with – how big is the tank? How deep especially.There are thermocouples available in a rigid probe form – quite how waterproof these are I'm not sure, but these are never very long, so you won't be able to get it more than 6 inches or so into the water before you risk complete submersion.

• The Turbidity Sensor

Turbidity is an indicator often used to find the amount of suspended sediment in water. By cumbersome mechanical sampling, it is possible to measure the concentration of suspended solids (in mg/ l) in water, but turbidity is increasingly used instead, as it is easy to use and cheaper too. It is an ecologically important parameter as the various effects of suspended solids in aquatic ecosystems are due to their light scattering properties rather than their absolute mass.

5.3 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 email, password, and confirming my password.	I can access my account/dashboard	High	Sprint-1
		USN-2	As a user, I will receive a confirmation email once I have registered for the application	I can receive e confirmation email & click confirm	High	Sprint-2
		USN-3	As a user, I can register for the application through Google	I can register & access the dashboard with Google	High	Sprint-1
		USN-4	As a user, I can register for the application through Gmail	I can register through the mail.	Medium	Sprint-2
	Login	USN-5	As a user, I can log into the application by entering email, password & captcha	I can receive login credentials.	High	Sprint-1
	Interface	USN-6	As a user, the interface should be user-friendly manner	I can able to access easily.	Medium	Sprint-1
Customer (Web user)	dashboard	WUSN-1	As a web user, I can access the specific info (ph value, temp, humidity, quality).	I can able to know the quality of the water.	High	Sprint-1
Customer Care Executive (input)	View manner	CCE-1	As a customer care, I can view data in visual representation manner(graph)	I can easily understand by visuals.	High	Sprint-1
	Taste	CCE-2	As a customer care , I can able to view the quality(salty) of the water	I can easily know whether it is salty or not	High	Sprint-1
	Color visibility	CCE-3	As a customer care , I can able predict the water color	I can easily know the condition by color	High	Sprint-1
Administrator	Risk tolerant	ADMIN-1	An administrator who Is handling the system should update and take care of the application.	Admin should monitor the records properly.	High	Sprint-2

6. PROJECT PLANNING & SCHEDULING

6.1 Sprint Delivery schedule :

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Point	Priority	Team Members
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	Sahana .P
Sprint-1		USN-2	As a user, I will receive confirmation email once I have registered for the application	1	High	Sahana .p
Sprint-2		USN-3	As a user, I can register for the application through Facebook	2	Low	Kiranisha .j
Sprint-1		USN-4	As a user, I can register for the application through Gmail	2	Medium	Shree sapna
Sprint-1	Login	USN-4	As a user, I can log into the application by entering email & password	1	High	Poojashri .h
Sprint-1	Dashboard	USN -5	As a user ,I can moniter ,measure, analyze relevant data in key areas	8	high	sahana .p

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

Velocity:

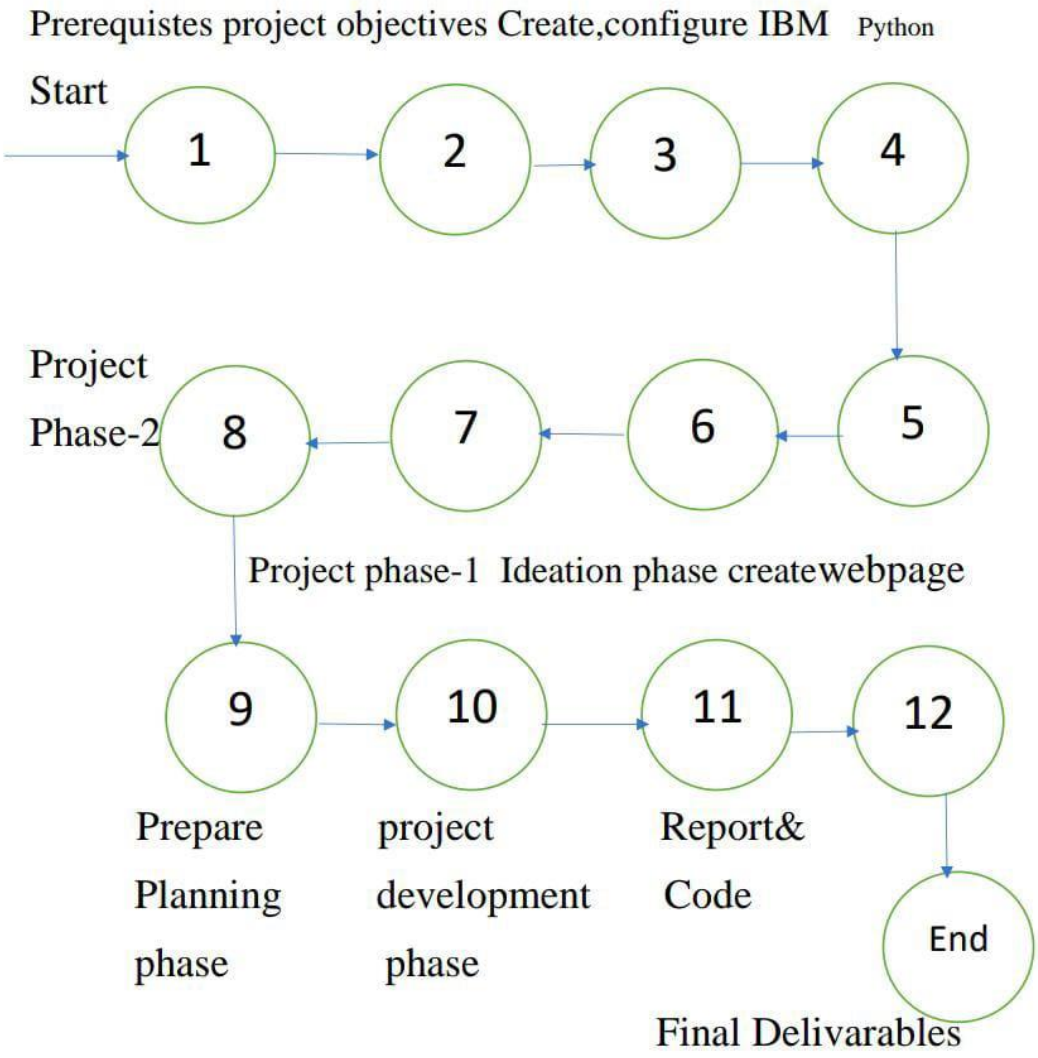
Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{10} = 2$$

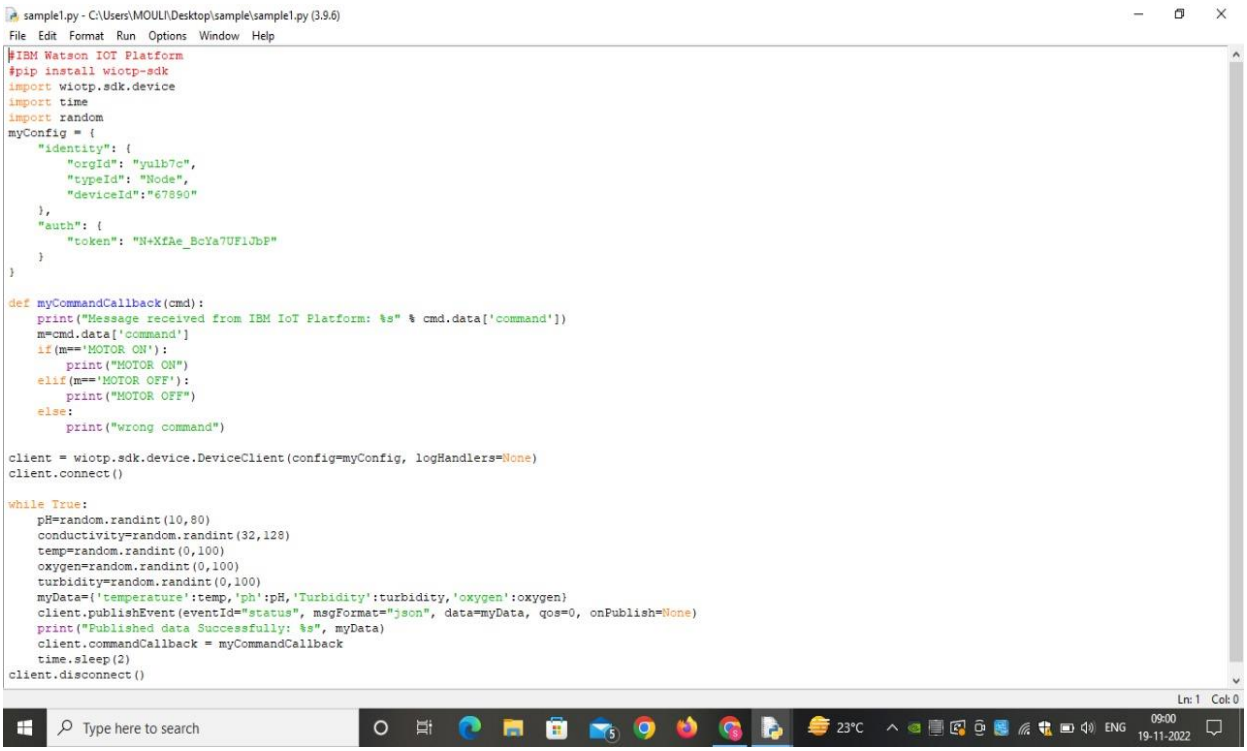
Burndown Chart:

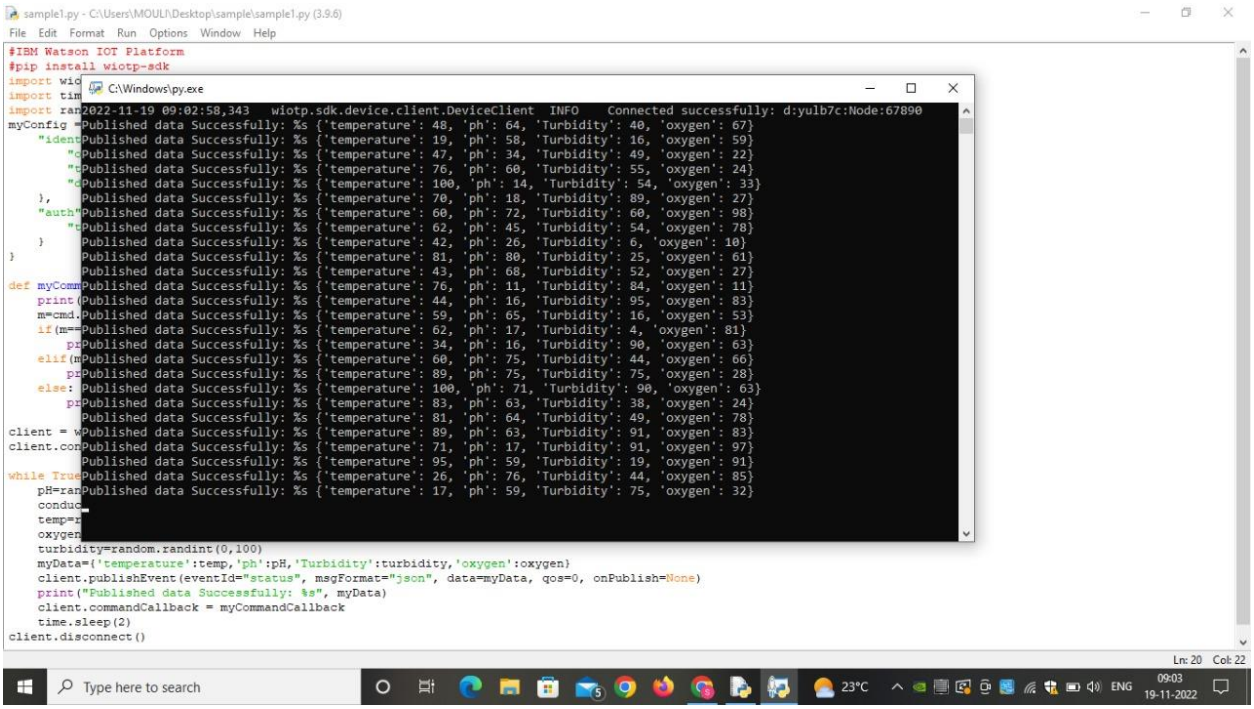
A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies suchas Scrum. However, burn down charts can be applied to any project containing measurable progress over time.

6.2 Milestone Activity Plan



7 . CODING AND SOLUTION


sample1.py - C:\Users\MOULI\Desktop\sample\sample1.py (3.9.6)
File Edit Format Run Options Window Help
#IBM Watson IOT Platform
#pip install wiotp-sdk
import wiotp.sdk.device
import time
import random
myConfig = {
"identity": {
"orgId": "yulb7c",
"typeId": "Node",
"deviceId":"67890"
},
"auth": {
"token": "N+XfAe_BoYa7UF1JbP"
}
}
def myCommandCallback(cmd):
print("Message received from IBM IoT Platform: %s" % cmd.data['command'])
m=cmd.data['command']
if(m=='MOTOR ON'):
print("MOTOR ON")
elif(m=='MOTOR OFF'):
print("MOTOR OFF")
else:
print("wrong command")
client = wiotp.sdk.device.DeviceClient(config=myConfig, logHandlers=None)
client.connect()
while True:
pH=random.randint(10,80)
conductivity=random.randint(32,128)
temp=random.randint(0,100)
oxygen=random.randint(0,100)
turbidity=random.randint(0,100)
myData={'temperature':temp,'ph':pH,'Turbidity':turbidity,'oxygen':oxygen}
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()
Ln: 1 Col: 0
Type here to search
23°C
ENG
09:00
19-11-2022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C:\Windows\py.exe
2022-11-19 09:02:58,343 wiotp.sdk.device.client.DeviceClient INFO Connected successfully: d:yulb7c:Node:67890
Published data Successfully: %s {'temperature': 48, 'ph': 64, 'Turbidity': 40, 'oxygen': 67}
Published data Successfully: %s {'temperature': 19, 'ph': 58, 'Turbidity': 16, 'oxygen': 59}
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Published data Successfully: %s {'temperature': 76, 'ph': 60, 'Turbidity': 55, 'oxygen': 24}
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Published data Successfully: %s {'temperature': 81, 'ph': 80, 'Turbidity': 25, 'oxygen': 61}
Published data Successfully: %s {'temperature': 43, 'ph': 68, 'Turbidity': 52, 'oxygen': 27}
Published data Successfully: %s {'temperature': 76, 'ph': 11, 'Turbidity': 84, 'oxygen': 11}
Published data Successfully: %s {'temperature': 44, 'ph': 16, 'Turbidity': 95, 'oxygen': 83}
Published data Successfully: %s {'temperature': 59, 'ph': 65, 'Turbidity': 16, 'oxygen': 53}
Published data Successfully: %s {'temperature': 62, 'ph': 17, 'Turbidity': 4, 'oxygen': 81}
Published data Successfully: %s {'temperature': 34, 'ph': 16, 'Turbidity': 90, 'oxygen': 63}
Published data Successfully: %s {'temperature': 60, 'ph': 75, 'Turbidity': 44, 'oxygen': 66}
Published data Successfully: %s {'temperature': 89, 'ph': 75, 'Turbidity': 75, 'oxygen': 28}
Published data Successfully: %s {'temperature': 100, 'ph': 71, 'Turbidity': 90, 'oxygen': 63}
Published data Successfully: %s {'temperature': 83, 'ph': 63, 'Turbidity': 38, 'oxygen': 24}
Published data Successfully: %s {'temperature': 81, 'ph': 64, 'Turbidity': 49, 'oxygen': 78}
Published data Successfully: %s {'temperature': 89, 'ph': 63, 'Turbidity': 91, 'oxygen': 83}
Published data Successfully: %s {'temperature': 71, 'ph': 17, 'Turbidity': 91, 'oxygen': 97}
Published data Successfully: %s {'temperature': 95, 'ph': 59, 'Turbidity': 19, 'oxygen': 91}
Published data Successfully: %s {'temperature': 26, 'ph': 76, 'Turbidity': 44, 'oxygen': 85}
Published data Successfully: %s {'temperature': 17, 'ph': 59, 'Turbidity': 75, 'oxygen': 32}
turbidity=random.randint(0,100)
myData={'temperature':temp,'ph':pH,'Turbidity':turbidity,'oxygen':oxygen}
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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19-11-2022

8 . TESTING

In our proposed method, an assembled Arduino microcontroller is used as the core controller of the system. Once the code is uploaded to the microcontroller, no PC system, keyboard command, monitor is required to operate the system.

The system functions automatically and independently according to the code uploaded to the microcontroller. In this system, three sensors are used to measure the essential water parameters. As it was studied from the previous researches, the most essential water parameters needed to be monitored by the average users are water pH level, water turbidity (cloudiness) and water temperature which is a measurement of the amount of the water in a container.

Therefore, four essential water parameters which are temperature, pH level and turbidity can be measured by this proposed system. Sensors circuits are connected to the microcontroller and the probes of the turbidity, pH, and temperature sensors placed inside the water.

A water proof temperature sensor is used to avoid any damage or electrical shock to the system and the user. An ultrasonic sensor is used to measure the level of the water in the

container. The ultrasonic sensor is connected in the system such that it will be placed on the top of the water container.

The ultrasonic sensor sends electromagnetic waves to the water surface and receives the wave back after touched the water surface. From the time taken to send and receive the wave by the ultrasonic sensor and the velocity of the electromagnetic waves, the distance which shows the water level in the container is calculated by the microcontroller.

All sensors read the water quality parameters and send the data to the microcontroller in the form of electrical signals.

The microcontroller is programmed such that is will analyze the result and compare it with the standard ranges which are predetermined in the code. If any water parameter crossed the standard limit, the alarm system will turn on.

In case of any abnormality in a water parameter detected by the microcontroller, the buzzer will buzz to indicate that the water is not proper for use. To show the

sensor readings (The water parameters) on the device itself, an LCD (Liquid Crystal Display) screen is used. The LCD screen is connected to the microcontroller, and through the wired connection, it receives the sensor readings from the microcontroller and displays them accordingly

9. RESULT

we are displaying the resulting sensed pH, temp, turbidity, and ORP values. It continuously the values of pH, temp, turbidity, and ORP and the resulting values are displayed to the LCD, PC or mobile in real-time. If the acquired value is above the threshold value comments will be displayed as 'BAD'. If the acquired value is lower than the threshold value comments will be displayed as 'GOOD'. A bar/line graph will also be shown for perfect understanding..

10. ADVANTAGES &DISAVANTAGES

- Following are the benefits or advantages of IoT based Water Quality Monitoring System are as follows.
  The boat is mobile in nature and hence large number of samples are easily collected from different locations in less time.
  It is very easy to maintain the IoT based water quality monitoring system as all the electronic boards are available in the boat itself.
  The system is very cheap as the hardware and software does not cost much.
  Machine learning techniques have made it very easy to plot the data collected in various formats for proper analysis.
  Cloud storage platforms such as adafruit, azure helps in storing the sensor data immediately and wirelessly to the robust servers.
- Following are the benefits or disadvantages of IoT based Water Quality Monitoring System are as follows.
- The system is less effective as sensors are installed very deep inside the water and their positions are fixed.
- The sensors are very expensive. Moreover their maintenance cost is also very high.

11. CONCLUSION

An IoT system was developed to monitor river Krishna in real time. The IoT system was used to collect the data fromidentified stations for different water quality parameterssuch as pH, turbidity, DO, BOD, NO3, temperature andconductivity to generate a data set that was used to monitor

the quality of water. The collected data were successfully utilized to assess the water quality of river Krishna usingone-Way ANOVA which analyze a particular parameterand predict the quality based on value obtained. Two-way ANOVA was used to do the analysis of two parameters asa single entity as well as a combination of two parameters.The results showed that one-Way ANOVA was best suited for training the IoT system. The observations showed that all the water quality parameters play a vital role in one or the other seasons. In summer season, the parameters conductivity and TDS were found to be more concentrated due to low water level in the river and the water quality was 30.39%. In rainy season, the water quality was 65.37% and the parameter affecting the water quality was DO. In winter seasons,DO was the parameter which affected the water quality and the water quality was 46.47%. The collected data set can also be used in future to make the system intelligent by applying machine learning techniques.

12. FUTURE SCOPE

The future scope of this project is monitoring environmental conditions, drinking water quality, treatment and disinfection of waste water etc. 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

Current water quality monitoring system is a manual system with a monotonous process and 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.