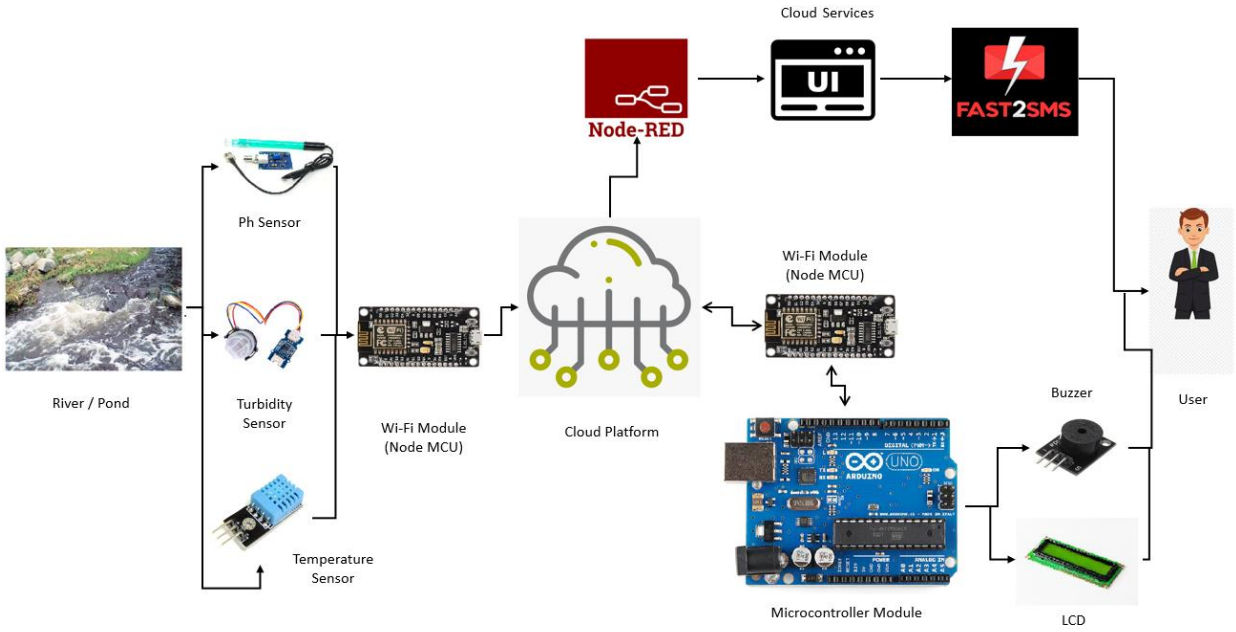
Project Design Phase -II
Technology Stack (Architecture & Stack)

Date	18 October 2022
Team ID	PNT2022TMID12777
Project Name	Project – Realtime River Water Quality Monitoring and Control System
Maximum Marks	4 Marks

Technical Architecture



1. First the Sensors (pH, Turbidity & Temperature) collect data from the concerned River / Pond.
2. The data is then transferred to the Cloud (IBM Cloud, Thingspeak, etc.,) through any wireless communication module like Wi-Fi (NodeMCU), Zigbee, etc.,
3. Once the data is transferred to the cloud, it is retrieved from the cloud using **Publish-Subscriber** model (because the user may have a desire to concentrate one entity alone).
4. The data is then retrieved using the above model and then it is transferred to the microcontroller module (Arduino, ESP8266, Raspberry Pi, etc.,) using any wireless communication module.
5. The data received will not be in realizable form so it is made realizable in the microcontroller module using mathematical relations.
6. The realizable values are then compared with the Standard values to find if there's any discrepancies in the Water quality.
7. If so, it'll raise the buzzer, give warning messages in the LCD, OLED displays, etc.,

8. Another case is the data is retrieved from the cloud it is sent to the Node red to provide flow-based development for visual programming.
9. Then we'll create web-based User Interface and then it is incorporated with Fast SMS to provide SMS based messages if, there is any discrepancies in water quality.

Table-1: Components and Technologies

S. No	Component	Description	Technology
1.	Sensors	To collect data in relevant to the parameter we see after.	pH (pH sensor kit), Turbidity (SKU: SEN0189) & Temperature (DHT-11, RTD, etc.,)
2.	Wireless Communication Module	To relay the data to cloud base for storage and retrieval at the receiver end.	Wi-Fi module (NodeMCU-ESP8266, etc.,)
3.	Cloud	To store the collected data and to establish the way in which the user wants to collect data.	IBM Cloudant, Thingspeak, etc.,
4.	Wireless Communication Module	To retrieve the data from the cloud for processing.	Wi-Fi module (NodeMCU-ESP8266, etc.,)
5.	Microcontroller Module	To process the raw data to realizable one and compare them with standard values.	Arduino (UNO, Nano, Mega, etc.,), Raspberry Pi, etc.,
6.	Application logic-1	To establish the logic in the evaluation of data in the microcontroller module.	C++ / Python
7.	Display and Indicators	To notify the user about the current situation.	LCD / OLED displays, Buzzers, etc.,
8.	Visual Programming	To provide flow-based development for wiring hardware devices and online services as part of IOT.	Node RED
9.	Application logic-2	To establish the logic	Java Script

10.	Web UI	To create User Interface through Web.	WEB UI
11.	SMS	To notify the user about the current situation or provide warning.	FAST SMS

Table-2: Application and Characteristics

S. No	Characteristics	Description	Technology
1.	Open-Source Frameworks & Platforms	In the project we'll be using some of the well reputed open – source platforms like Arduino, Thingspeak	Arduino is written in C / C++, Thingspeak is developed in RUBY.
2.	Security Implementations	In order to have secure connection between modules we rely on security features available within them to have encrypted connection.	Wi-Fi – WPA, WPA2, WPA3, IBM Cloudant - LUKS1 with 256-bit Advanced Encryption Standard (AES-256)
3.	Scalable Architecture	If suppose, to increase the scale in terms of area covered we may vary the size of the cloud storage to accommodate the data also the no. of components used.	Thingspeak, an IoT platform that lets us to analyse and visualise the data even for devices that are nonfunctioning in the mainframe.
4.	Performance	To increase the performance of the device in terms of how efficiently it uses the input it receives, how quickly it relays the information, etc.,	I2C protocol can be used to relay information to LCD displays, etc.,