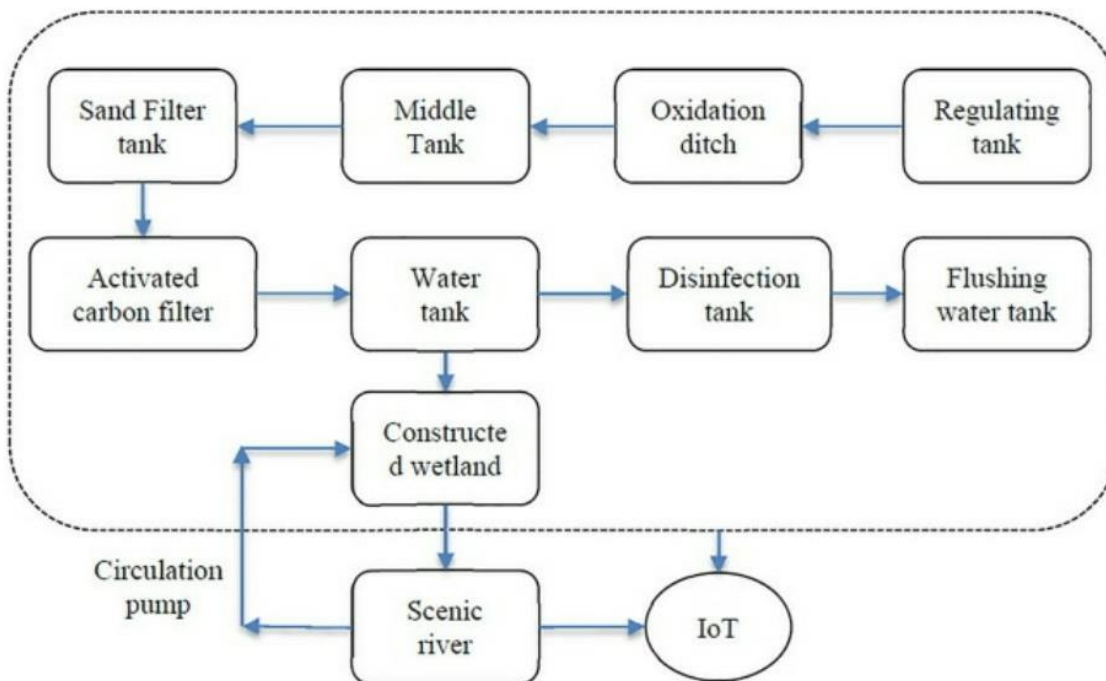# NSN COLLEGE OF ENGINEERING AND TECHNOLOGY– GROUP 4

PHASE 3 –SMART WATER MANAGEMENT USING IoT

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Block Diagram:

Regulating tank:

In case of severe weather such as a thunderstorm, the control tank helps to limit the flow of water. In the case of heavy rain, the water enters the tank with maximum flow and comes out of the tank in the upper part with a perfectly controlled flow.

Oxidation ditch:

The key difference between oxidation pond and oxidation ditch is that an oxidation pond is a large, shallow pond designed to treat wastewater through the interaction of sunlight, bacteria, and algae, whereas an oxidation ditch is a modified activated sludge that involves biological treatment processes which are utilizing long solids retention times for the removal of biodegradable organics.

Middle tank:

Medium tanks had the speed and maneuverability of light tanks, but the armor and weapons of heavy tanks. Armies used medium tanks to exploit weaknesses along the flanks of an enemy position, or as a reaction force to shore up a line that was under attack.

Sand Filter tank:

Sand filters are actually a type of tank that has an inlet and an outlet valve and nozzles with sand and silica coating. Particles suspended in water will not pass through the filter and nozzle covered with sand grains, and eventually the water outlet will be clean and purified.

Activated carbon filter:

Activated carbon filters are generally employed in the process of removing organic compounds and/or extracting free chlorine from water, thereby making the water suitable for discharge or use in manufacturing processes.

Water tank:

A water tank is a container for storing water. They are used to provide storage of water for use in many applications, drinking water, irrigation agriculture, fire suppression, agricultural farming, both for plants and livestock, chemical manufacturing, food preparation as well as many other uses. Water tank parameters include the general design of the tank, and choice of construction materials, linings.

Disinfection tank:

Chlorination is the most common form of disinfection and successfully controls many micro-organisms. CALCULATING THE SIZE OF YOUR TANK FOR CHLORINATION. Tanks come in a variety sizes ranging from 750 L (165 gallons) to over 50 000 L (11 000 gallons).

Flushing water tank:

An RV black tank flush is a cleaning system that works in tandem with your regular RV tank dumping procedure. For example, you generally dump your black tank and then flush out the sewer hose by dumping the contents of your gray tank immediately thereafter.

Constructe wetland:

A constructed wetland is an artificial wetland to treat sewage, greywater, stormwater runoff or industrial wastewater. It may also be designed for land reclamation after mining, or as a mitigation step for natural areas lost to land development.

Scenic river:

Those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

Circulation pump:

Boiler circulating pumps circulate water within the boiler to enhance boiler operation. They take suction from a header connected to the bottom of the boiler drum and discharge through additional tube circuits. This means the water pumped is at boiler temperature and pressure.

IoT:

The term IoT, or Internet of Things, refers to the collective network of connected devices and the technology that facilitates communication between devices and the cloud, as well as between the devices themselves.

Python Script:

To implement a smart water management system using IoT and Python, you will need the following components:

IoT devices/sensors: These could include water flow sensors, moisture sensors, water level sensors, etc. These sensors will provide data on water usage, soil moisture, and water levels.

IoT platform: You will need an IoT platform to receive data from the sensors, process it, and send control commands. IBM Watson IoT Platform, AWS IoT Core, or Google Cloud IoT are popular choices.

Actuators: These devices will be controlled based on the data received from the sensors. Examples include solenoid valves, pumps, or sprinklers.

Python script: This script will interface with the sensors, collect and process data, and send control signals to the actuators.

Here's an example Python script that demonstrates how to monitor soil moisture levels and control a water pump using the MQTT protocol and the Adafruit IO platform:

```
import time

import RPi.GPIO as GPIO

from Adafruit_IO import MQTTClient


# Set the credentials for the Adafruit IO platform

ADAFRUIT_IO_USERNAME = '<YOUR_AIO_USERNAME>'

ADAFRUIT_IO_KEY = '<YOUR_AIO_KEY>'


# Set the GPIO pin number for the water pump

PUMP_PIN = 18


# Set the moisture threshold
```

```python
MOISTURE_THRESHOLD = 50

# Create an MQTT client for the Adafruit IO platform
client = MQTTClient(ADAFRUIT_IO_USERNAME, ADAFRUIT_IO_KEY)

# Define the callback function for handling incoming MQTT messages
def on_message(client, feed_id, payload):
    print('Received data: ', payload)

# Set the callback function for incoming MQTT messages
client.on_message = on_message

# Connect to the Adafruit IO MQTT broker
client.connect()

# Subscribe to the soil moisture feed
moisture_feed = '<YOUR_MOISTURE_FEED>'
client.subscribe(moisture_feed)

# Configure the GPIO pin for the water pump
GPIO.setmode(GPIO.BCM)
GPIO.setup(PUMP_PIN, GPIO.OUT)

while True:
```

```python
    # Get the latest soil moisture reading from the Adafruit IO feed
    moisture = client.receive(moisture_feed).value

    # If the soil moisture is below the threshold, turn on the water pump
    if moisture < MOISTURE_THRESHOLD:
        GPIO.output(PUMP_PIN, GPIO.HIGH)
        print('Water pump turned on')
    else:
        GPIO.output(PUMP_PIN, GPIO.LOW)
        print('Water pump turned off')

    time.sleep(5)  # Adjust the delay as per your requirement

# Clean up GPIO pins and disconnect from the Adafruit IO broker
GPIO.cleanup()
client.disconnect()
```

Make sure to replace <YOUR_AIO_USERNAME> , <YOUR_AIO_KEY> , <YOUR_MOISTURE_FEED> , and adjust the code based on your specific sensors, actuators, and their reading/control logic.

This is a basic example, and you can expand it to handle multiple sensors, implement data analysis, and incorporate other functionalities based on your smart water management system requirements.