

College name: JP COLLEGE OF ENGINEERING

College code: 9512

Project ID :Proj_211932_Team_2

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Phase 4 : Development Part 2

Topic:Smart Water Management

Front-End:

1. User Interface (UI): Create a user-friendly web interface using HTML, CSS, and JavaScript to display the real-time data. Consider using a framework like React or Angular for a more interactive UI.
2. Dashboard: Design a dashboard where users can view the level of water in a tank. You can use charts or graphs to present the information visually.
3. Real-time Updates: Implement WebSocket technology to enable real-time updates without the need for constant page refresh. Libraries like Socket.io can help with this.

Back-End:

4. IoT Devices: Set up IoT devices (e.g., sensors) to collect level of water. These devices should send data to your platform periodically.
5. Data Collection: Create an API or server that can receive and process data from IoT devices. Use a suitable programming language like Node.js, Python, or Java.
6. Database: Store the received data in a database (e.g., MySQL, MongoDB) for historical records and analytics.

7. Authentication and Authorization: Implement user authentication to ensure that only authorized users can access the data.

8. APIs: Design RESTful or GraphQL APIs to handle data retrieval and ensure that your front-end can fetch data from the back-end.

9. Real-time Data Processing: Use a real-time data processing framework or message broker like Apache Kafka or MQTT to handle incoming data streams efficiently.

10. Data Presentation: Convert the received data into appropriate formats (e.g., JSON) and send it to the front-end for real-time display.

Security:

11. Security Measures: Implement security measures such as HTTPS for data transmission, secure authentication, and proper data encryption to protect user and device data.

Scalability:

12. Scalability: Ensure that your platform is scalable to accommodate a growing number of IoT devices and users. Consider containerization and cloud hosting for scalability.

Maintenance and Monitoring:

13. Monitoring: Set up monitoring tools to track the health and performance of your system and receive alerts for issues.

14. Maintenance: Regularly update and maintain your platform to ensure it continues to function smoothly.

Data Processing and Analytics:

15. The collected data is processed and analysed to derive valuable insights. Advanced analytics techniques may be used to detect trends, anomalies, and patterns within the data.

16. Creating a real-time smart water Management platform involves a combination of front end and back-end technologies. Here's a simplified outline using C and C++ and python programming with Wi-Fi connection for the front end and Node.js for the back end.

C++ code:

```
#include <LiquidCrystal.h>
```

```
# define echoPin 2 // Echo Pin

# define trigPin 3 // Trigger Pin

int maxRange = 200; // Maximum range

int minRange = 10; // Minimum range

long dur, dist; // Duration used to calculate distance

int val;

int tempPin = 1;

int red_light_pin= 13;

int green_light_pin = 10;

int blue_light_pin = 12;

LiquidCrystal lcd(11, 9, 7, 6, 5, 4);
```

```
void setup()

{

    pinMode(LED_BUILTIN, OUTPUT);

    pinMode(trigPin, OUTPUT);

    pinMode(echoPin, INPUT);

    pinMode(8,OUTPUT);

    pinMode(red_light_pin, OUTPUT);

    pinMode(green_light_pin, OUTPUT);

    pinMode(blue_light_pin, OUTPUT);

    lcd.begin(16, 2);

    // Print a message to the LCD.

}
```

```
void loop()

{
```

```

        digitalWrite(trigPin, LOW);
    delayMicroseconds(2);
    digitalWrite(trigPin, HIGH);
    delayMicroseconds(10);
    digitalWrite(trigPin, LOW);
    dur = pulseIn(echoPin, HIGH);
    dist = dur / 58.2;

//temperature
    val = analogRead(tempPin);
    float mv = ( val/1024.0)*5000;
    float cel = mv/10;
    float farh = (cel*9)/5 + 32;
    if(cel>48){
        RGB_color(255, 0, 0);
        lcd.setCursor(0, 0);
        lcd.print("HOT");
        lcd.setCursor(1,1);
        lcd.print(cel);
    }
else if(cel<16){
    RGB_color(0, 0, 255);
    lcd.setCursor(0, 0);
    lcd.print("COLD");
    lcd.setCursor(1,1);
    lcd.print(cel);

}

```

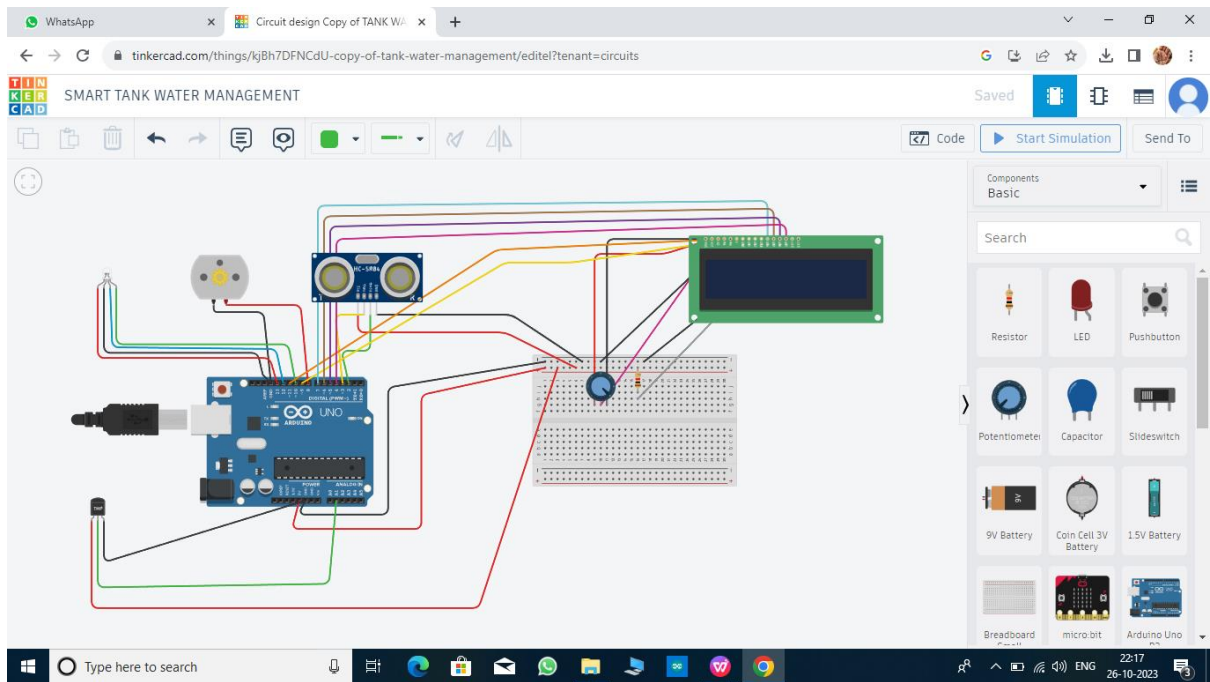
```
    if (dist <= minRange)
    {
        digitalWrite(8, LOW);
    }

    else if(dist >= maxRange){
        digitalWrite(8,HIGH);
        delay(10000);
    }
    else
    {
        digitalWrite(8, LOW);
    }
    delay(50);

}
```

```
void RGB_color(int red_light_value, int green_light_value, int blue_light_value)
{
    analogWrite(red_light_pin, red_light_value);
    analogWrite(green_light_pin, green_light_value);
    analogWrite(blue_light_pin, blue_light_value);
}
```

BEFORE SIMULATION:



AFTER SIMULATION:

