Phase 2 – Innovation

Smart Water Project

- **Aim:**

  This project can provide comprehensive solutions to the challenges facing water resource management and contribute to sustainable, efficient, and resilient water systems for the future.

- **IoT Microcontrollers:**

  Raspberry Pi is a robust choice for data-intensive projects with extensive processing needs.
  Arduino boards are reliable and power-efficient, making them suitable for sensor data collection.
  Particle boards are designed for IoT applications with cloud connectivity.
  ESP32 and ESP8266 are ideal for low-power, wireless data transmission.

- **Sensors :**

  The sensors used should satisfy project's objectives, such as water quality monitoring, leak detection, flow measurement, or any other specific needs

  Water Quality Sensors:

  pH Sensors: Measure the acidity or alkalinity of water.
  Turbidity Sensors: Assess water clarity and the level of suspended particles.

  Conductivity Sensors: Measure the water's ability to conduct an electrical current, which is related to the dissolved solids content.

  Dissolved Oxygen Sensors: Determine the oxygen levels in the water, crucial for aquatic life.

  Total Dissolved Solids (TDS) Sensors: Measure the concentration of inorganic and organic substances in water.

  Redox (ORP) Sensors: Measure the oxidation-reduction potential, indicating the water's disinfection capability.

Flow Sensors:
Measure the rate of water flow in pipes and can be used to monitor water distribution and detect leaks.

Ultrasonic Flow Sensors:
Use ultrasonic technology to measure flow rates non-invasively.

Pressure Sensors: Monitor water pressure in the distribution system

Level Sensors:
Ultrasonic Level Sensors: Measure water levels in tanks or reservoirs.
Temperature Sensors:

Temperature Probes or Sensors: Monitor water temperature, which is important for various water management applications.

Leak Detection Sensors:

Acoustic Sensors: Detect sounds associated with water leaks in pipes.

Pressure Sensors: Monitor pressure changes, which can indicate leaks.

Flow Sensors: Abnormal flow patterns may indicate leaks.

Water Depth Sensors:

Submersible Pressure Transducers: Measure water depth in tanks, reservoirs, or wells.

Chemical Sensors:
Measure specific chemical parameters, such as chlorine or chlorine dioxide, for water treatment and disinfection

- ## Connectivity:

Connectivity enables data transmission, remote monitoring, and real-time control.
Wi-Fi: Wi-Fi connectivity is widely used for local data transmission within a specific area. It's cost-effective and provides high data transfer

speeds. However, the range is limited to the coverage of the Wi-Fi network.

Cellular (4G/5G): Cellular connectivity allows for remote monitoring over a wider geographical area. It's particularly useful for locations without Wi-Fi coverage. Cellular networks provide reliable and always-on connectivity, making them suitable for real-time data transmission.

Cellular connectivity can be used for remote monitoring, while Wi-Fi may be used for local, in-park sensors.

- **Cloud:**
  ThingSpeak, is a free IoT platform that offers data collection, visualization, and analysis capabilities. It's well-suited for smaller-scale projects and is relatively straightforward to set up and use.

- **Protocols:**
  MQTT (Message Queuing Telemetry Transport)

  CoAP (Constrained Application Protocol)

  LoRaWAN (Long Range Wide Area Network)

- **Public Platform:**
  The features that enhance accessibility, user engagement, and data sharing while ensuring security and scalability.
  It also provides a comprehensive information and keeping the platform user-friendly and accessible. Additionally, data security and privacy considerations are followed.