SNS COLLEGE OF TECHNOLOGY

Coimbatore-35

An Autonomous Institution

Accredited by NBA – AICTE and Accredited by NAAC – UGC with

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Chennai

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

19ECE306- SMART IoT APPLICATIONS

III ECE / V SEMESTER

UNIT 2 – BASICS APPLICATION

TOPIC 4 –Smart Water: Potable water monitoring

Smart water quality monitoring

An IoT-based smart water quality monitoring system uses smart water quality sensor technology to measure water parameters such as temperature, dissolved oxygen levels, presence of suspended solids, TDS level, pH, turbidity, and more.

Key Water Quality Parameters

- pH Value: 6.5 - 8.5 (No relaxation)

- Total Dissolved Solids (TDS): 500 mg/L (Acceptable) | 2,000 mg/L (Permissible)

- Turbidity: 1 NTU (Acceptable) | 5 NTU (Permissible)

- Total Hardness (as CaCO3): 200 mg/L (Acceptable) | 600 mg/L (Permissible)

- Chloride (Cl): 250 mg/L (Acceptable) | 1,000 mg/L (Permissible)

- Fluoride (F): 1.0 mg/L (Acceptable) | 1.5 mg/L (Permissible)

Key Water Quality Parameters

- Nitrate (NO3): 45 mg/L (No relaxation)

- Iron (Fe): 0.3 mg/L (No relaxation)

- Arsenic (As): 0.01 mg/L (Acceptable) | 0.05 mg/L (Permissible)

- Lead (Pb): 0.01 mg/L (No relaxation)

- Residual Free Chlorine: 0.2 mg/L (No relaxation)

- E. coli: Must not be detectable in any 100 mL sample

- Total Coliforms: Must not be detectable in any 100 mL sample

Taxonomy diagram of water quality monitoring system.
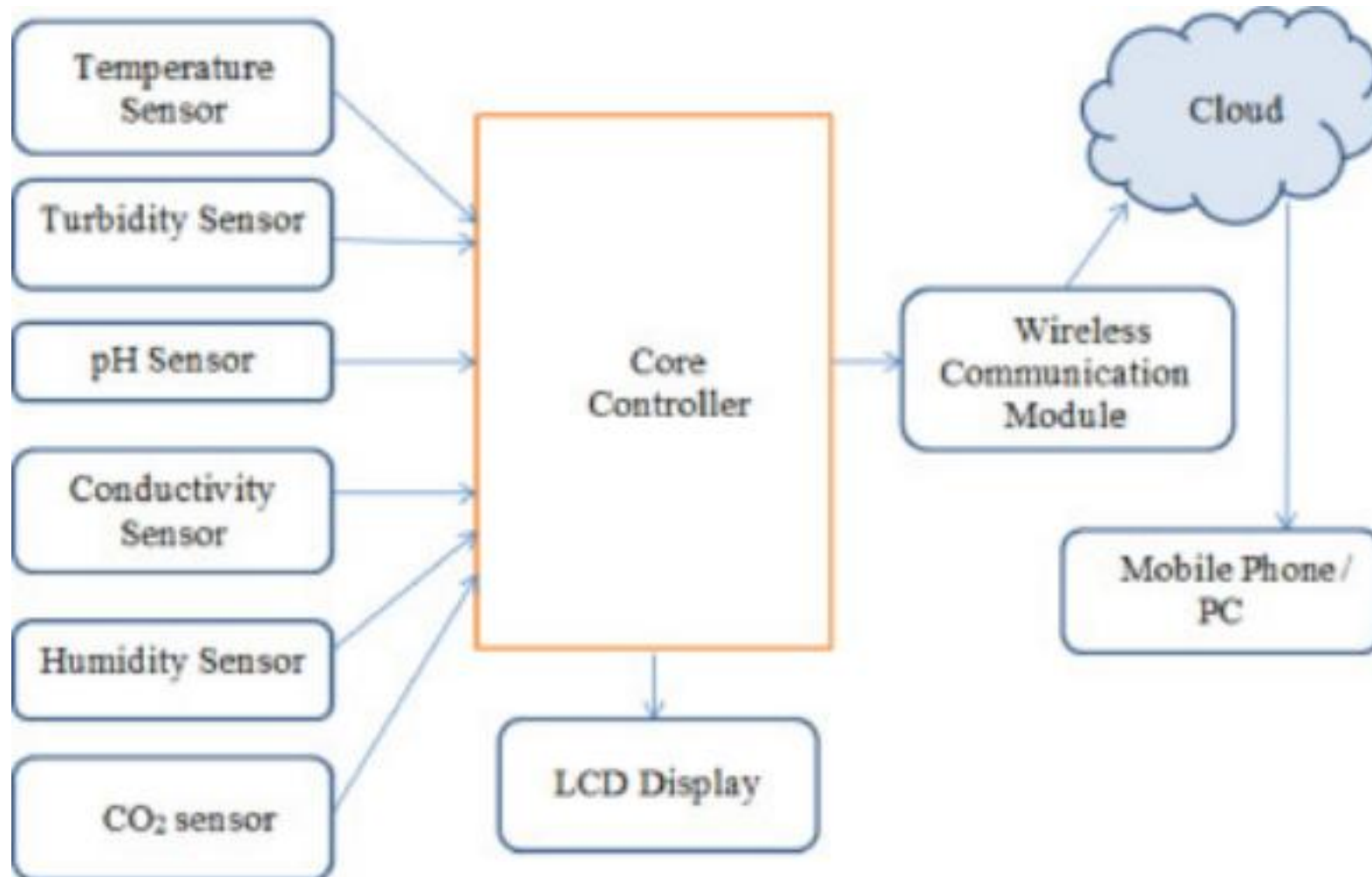
Components of a Smart Water Monitoring System

Sensors:

- pH Sensor: Measures the acidity or alkalinity of water.

- Turbidity Sensor: Monitors water clarity to detect particulate matter.

- Conductivity Sensor: Measures the ability of water to conduct electricity, indicating the presence of ions.

- Temperature Sensor: Tracks the water temperature, which can affect other water quality parameters.

- Dissolved Oxygen (DO) Sensor: Indicates the amount of oxygen present in water, crucial for aquatic life.

- Total Dissolved Solids (TDS) Sensor: Measures the concentration of dissolved substances in water.

- Chlorine Sensor: Monitors the level of chlorine used for water disinfection.

Components of a Smart Water Monitoring System

Microcontroller or Microprocessor:

Devices like Arduino, Raspberry Pi, or ESP8266/ESP32 can be used to interface with sensors, process data, and transmit it to a central server or cloud platform.

Communication Module:

Wi-Fi, GSM, LoRa, or NB-IoT: Facilitates wireless communication to send sensor data to a cloud server for analysis and storage.

Components of a Smart Water Monitoring System

Cloud Platform:

A cloud-based server can store and analyze the data, generate reports, and trigger alerts if water quality parameters are outside safe limits. Examples include AWS IoT, Azure IoT Hub, or Google Cloud IoT.

Dashboard and Mobile App:

A user-friendly interface where data is visualized in real time. It can show trends, alerts, and predictive analytics for better decision-making.
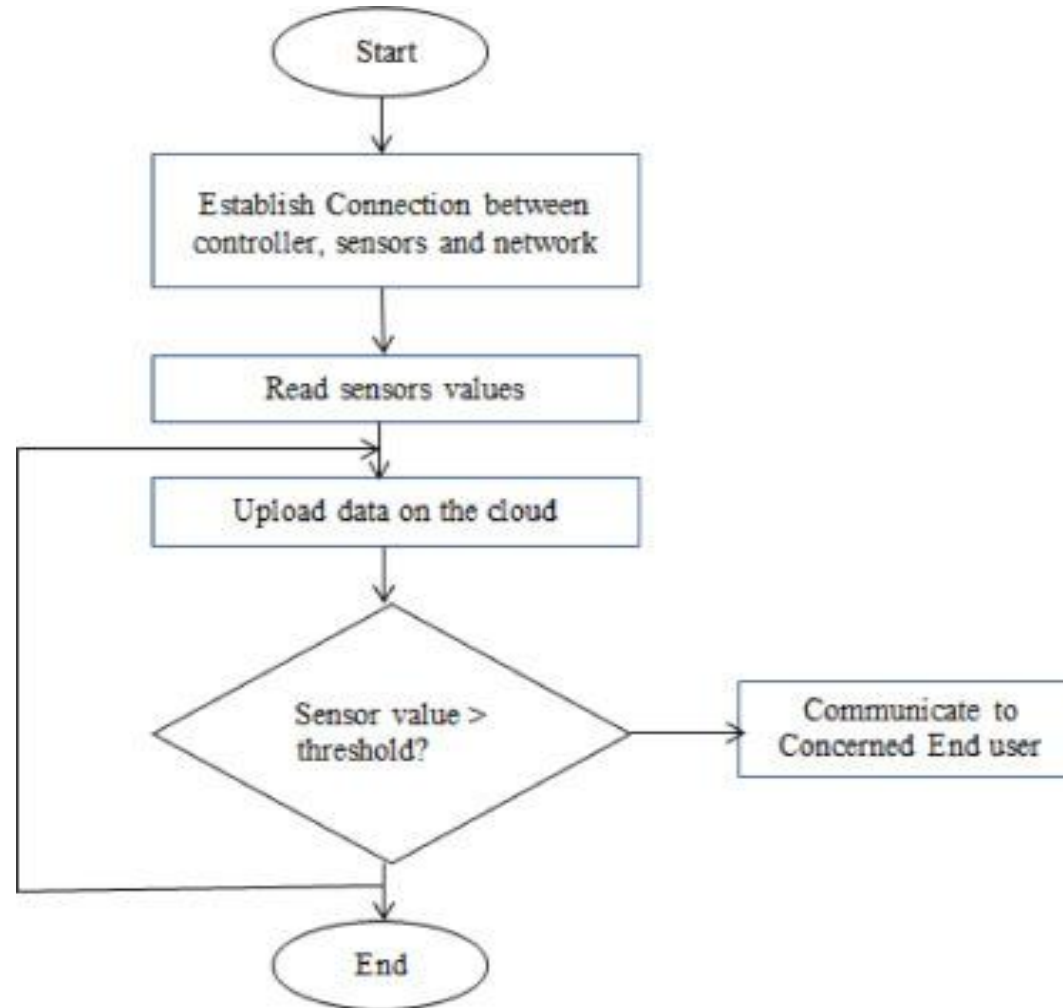
Data Analytics:

Machine learning algorithms can predict potential issues, optimize water usage, and detect anomalies like pipe leakage or contamination.

The operating flow chart of smart water quality monitoring system.

Develope Model

Applications

Urban Water Supply Systems: Ensures the quality of water supplied to households.

Industrial Usage: Monitors water quality for industries that require high-quality water, such as food processing, pharmaceuticals, and electronics.

Agriculture: Ensures that irrigation water is of appropriate quality for crops.

Schools and Institutions: Guarantees the safety of drinking water in public and private establishments.