NAVODAYA INSTITUTE OF TECHNOLOGY, RAICHUR

DEPARMENT OF COMPUTER SCIENCE & ENGINEERING

IOT Lab

Program - 07

07 Develop a program to read the pH value of a various substances like milk, lime and water

🔧 Components Required

- Arduino Uno (or compatible)
- pH Sensor Kit (pH probe + interface module)
- Breadboard + jumper wires
- Beakers with test samples: **milk, lime water, normal water**
- Distilled water (for rinsing probe)

⚡ Working Principle

- The **pH probe** outputs a small voltage proportional to the pH of the solution.
- The **pH sensor interface board** amplifies and conditions this signal.
- Arduino reads the analog value (A0) and converts it to a **pH value** using calibration.

🔌 Circuit Connections

- pH sensor module **VCC → 5V**
- pH sensor module **GND → GND**
- pH sensor module **Analog Output (AO) → A0 (Arduino)**

🧪 Steps to Do the Experiment

1. Connect the pH sensor module to Arduino as per wiring.
2. Upload the code (below).
3. **Calibration**:

NITPulse

- Use standard **buffer solutions** (pH 4.0, 7.0, and 10.0) to calibrate your sensor.
- Note the analog values at these known pH points.
- Adjust the calibration formula in code.

4. Rinse the pH probe with distilled water.
5. Dip it into **milk**, wait for stable reading, note pH.
6. Rinse probe again → test **lime water** → note pH.
7. Rinse again → test **plain water** → note pH.
8. Compare readings with expected values:
   - Milk → ~6.5
   - Water → ~7.0 (neutral)
   - Lime water → ~12 (alkaline)

💻 Arduino Program

```
// pH Sensor with Arduino
// Reads pH of different substances like milk, lime water, and normal water

const int pH_Pin = A0;
float calibration = 21.34;  // adjust after calibration with buffer solutions

void setup() {
  Serial.begin(9600);
}

void loop() {
  int sensorValue = analogRead(pH_Pin);

  // Convert to voltage (assuming 5V ADC, 10-bit resolution)
  float voltage = sensorValue * (5.0 / 1023.0);

  // Convert voltage to pH (linear relation, calibration required)
  float pH = 7 + ((2.5 - voltage) * calibration);

  Serial.print("Sensor Value: ");
  Serial.print(sensorValue);
  Serial.print(" | Voltage: ");
  Serial.print(voltage);
  Serial.print(" V | pH: ");
  Serial.println(pH);

  delay(1000);
}
```

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