SMART HOME AUTOMATION

INTRODUCTION

Wireless Sensor Networks (WSNs) enable seamless smart home automation by interconnecting and coordinating household devices. They use distributed sensors to monitor environmental conditions and automate lighting, appliances, and security. This enhances system responsiveness, efficiency, and safety through real-time data communication.

EQUIPMENTS USED

- Arduino UNO
- HC-05 Bluetooth Wireless UART Module
- Raindrop Detection Sensor Module
- IR Infrared Flame Sensor Module
- DHT11 Temperature And Humidity Sensor Module
- Breadboard
- LED Lights
- Jumper Wires

ABOUT THE SENSORS

- **Bluetooth Sensor:** Enables wireless communication between smart home devices, allowing remote control and automation.
- **Flame Sensor:** Detects fire or high heat levels and triggers alerts for early fire prevention.
- **Rain Sensor:** Senses rainfall to automate windows, roofs, or irrigation systems for weather-based adjustments.
- **DHT Sensor:** Measures temperature and humidity, helping to maintain a comfortable indoor environment.

IMPLEMENTATION

1. **Sensor Integration**
2. **Data Processing**
3. **Automation & Control**

This implementation ensures a responsive, automated, and efficient smart home system using wireless sensor networks and Arduino-based control.

CODE

```cpp
void loop() {
  float temperature = dht.readTemperature(); // Read DHT sensor values
  float humidity = dht.readHumidity();
  if (isnan(temperature) || isnan(humidity)) {
    Serial.println("Error reading DHT sensor!");
    BTSerial.println("Error reading DHT sensor!");
    return;}
  int rainAnalogValue = analogRead(RAIN_SENSOR_ANALOG_PIN); // Read rain sensor values
  int rainDigitalValue = digitalRead(RAIN_SENSOR_DIGITAL_PIN);
  int flameSensorValue = digitalRead(FLAME_SENSOR_PIN); // Read flame sensor values (digital)
  digitalWrite(TEMP_LED, temperature > 30 ? HIGH : LOW);  // Turn ON if temp > 30°C
  digitalWrite(RAIN_LED, rainAnalogValue < 400 ? HIGH : LOW);  // Turn ON if rain detected
  digitalWrite(FLAME_LED, flameSensorValue == LOW ? HIGH : LOW); // Turn ON if flame detected
  String sensorData = "Temperature: " + String(temperature) + " °C\n";
  sensorData += "Humidity: " + String(humidity) + " %\n";
  sensorData += "Rain Detected: " + String(rainAnalogValue > 400 ? "No" : "Yes") + "\n";
  sensorData += "Flame Detected: " + String(flameSensorValue == HIGH ? "No" : "Yes") + "\n";
  sensorData += "Rain Analog Value: " + String(rainAnalogValue) + "\n";
  Serial.println(sensorData); // Print data to Serial Monitor
  BTSerial.println(sensorData); // Send data via Bluetooth
  if (BTSerial.available()) { // Check for data received via Bluetooth (Control LED)
    String receivedData = BTSerial.readStringUntil('\n');
    receivedData.trim();
    Serial.print("Received via Bluetooth: ");
    Serial.println(receivedData);
    if (receivedData == "1")
      digitalWrite(CONTROL_LED, HIGH);
    else if (receivedData == "0")
      digitalWrite(CONTROL_LED, LOW);
  }
  if (Serial.available()) {
    String sendData = Serial.readStringUntil('\n');
    Serial.print("Sending to Bluetooth: ");
    Serial.println(sendData);
    BTSerial.println(sendData);
  }
  delay(2000); // Delay for readability
}
```

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RESULTS


```
15:17:29.776 Temperature: 33.80 °C
15:17:29.776 Humidity: 66.00 %
15:17:29.776 Rain Detected: No
15:17:29.776 Flame Detected: No
15:17:29.776 Rain Analog Value: 565
15:17:29.776
15:17:31.979 Temperature: 33.80 °C
15:17:31.979 Humidity: 66.00 %
15:17:31.979 Rain Detected: No
15:17:31.979 Flame Detected: No
15:17:31.979 Rain Analog Value: 562
15:17:31.979
15:17:34.134 Temperature: 33.80 °C
15:17:34.134 Humidity: 66.00 %
15:17:34.134 Rain Detected: No
15:17:34.134 Flame Detected: No
15:17:34.134 Rain Analog Value: 575
15:17:34.134
15:17:36.312 Temperature: 33.80 °C
15:17:36.312 Humidity: 66.00 %
15:17:36.312 Rain Detected: No
15:17:36.312 Flame Detected: No
15:17:36.312 Rain Analog Value: 559
15:17:36.312
```

COM4

```
Rain Analog Value: 650

Temperature: 32.80 °C
Humidity: 75.00 %
Rain Detected: No
Flame Detected: No
Rain Analog Value: 649

Temperature: 32.80 °C
Humidity: 75.00 %
Rain Detected: No
Flame Detected: No
Rain Analog Value: 647
```

☑ Autoscroll ☐ Show timestamp

THANK YOU

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