**Project Proposal**

**Course Code and Title:** CS-327 Computer Communication Networks  
**Project Title:** Smart Alert & Notification System for Environmental Events

**1. Project Idea**

This project aims to design and implement a **real-time alert broadcasting system** that simulates **environmental warning notifications** (e.g., temperature spikes, air quality issues, or flood alerts).

A **central server** will continuously monitor **simulated sensor data** and immediately **broadcast alerts** to all connected client systems through **TCP socket communication**.

The purpose of this project is to demonstrate **reliable, low-latency, and sustainable communication** between multiple nodes, similar to how early warning systems work in **smart cities**, **campuses**, and **industrial environments**.

**2. Objectives**

* To design and implement a **client-server network architecture** using TCP sockets.
* To **simulate environmental events** and deliver alerts to all connected clients in real time.
* To ensure **efficient broadcasting** and **low latency** in message delivery.
* To highlight how networked communication systems can support **environmental safety and sustainability**.
* To evaluate **performance metrics** such as latency and packet flow using monitoring tools.

**3. Tools and Technologies**

* **Programming Language:** Python (socket module)
* **Packet Analysis:** Wireshark
* **Testing/Simulation:** Multiple terminal windows or LAN devices
* **Operating System:** Windows

**4. Expected Outcomes**

* A working **real-time environmental alert broadcasting system** over a network.
* Multiple clients receiving alerts simultaneously with minimal delay.
* **Packet-level analysis** of communication using Wireshark.
* Demonstration of **transport layer communication**, **network topology**, and **practical system design**.

**5. Relevance to Course Learning Outcomes (CLOs)**

* **CLO-1:** Demonstrates basic network topology and TCP/IP socket communication.
* **CLO-2:** Explores operational and design issues of real-time client-server communication.
* **CLO-3:** Shows how communication networks can support **environmental protection and sustainability** by enabling early warnings and efficient response.

**6. Alignment with Complex Problem Attributes (CPA)**

* **CPA-1 (Depth of Analysis):** Requires abstraction to model real-time broadcasting with no predefined solution.
* **CPA-2 (Level of Interaction):** Involves managing communication between multiple nodes with timing and delivery challenges.
* **CPA-3 (Familiarity):** Extends basic socket programming concepts to build a practical and sustainable communication system.