Dear Students,

As discussed earlier, you are required to submit a project on Computer Networks at the end of this semester. To ensure a structured approach, please follow the guidelines below:

Project Requirements:

1. Presentations:

- Project Proposal Presentation: You will present your project proposal to the instructors for approval. This step is crucial to ensure your project aligns with the course objectives.
- Final Presentation: After completing your project, you will deliver a final presentation to showcase your work, findings, and contributions.

2. Project Report:

A detailed project report must be submitted along with the final implementation. The report should include the following sections:

i. Introduction
  - Objective: Clearly define the goal of the project.
  - Motivation: Explain why the project is important and relevant.
  - Contribution: Highlight the key contributions your project brings to the field.
ii. Background Studies (if needed)
  - Provide a summary of concepts, technologies, or frameworks essential for understanding your project.
iii. State-of-the-Art/Related Works
  - Compare and analyze existing works in the same area.
  - Highlight gaps or limitations in these works that your project aims to address.
iv. Methodology
  - Detail the approach or process you followed for the project implementation.
  - Include diagrams, algorithms, or workflows if applicable.
v. Results/Findings
  - Present the outcomes of your project using tables, charts, or figures.
  - Analyze and discuss the significance of the results.
vi. Conclusion
  - Summarize your findings and their implications.
  - Suggest possible improvements or future directions for the project.

References

  - Cite all the resources, papers, and tools used in your project.
  - Follow a consistent citation format (e.g., IEEE or APA).

3. Implementation Tools:

The project must be implemented using a simulation tool. As part of our lab sessions, we have learned Packet Tracer, and you are encouraged to utilize it or explore other tools, such as:

- Packet Tracer
- GNS3
- NS3
- Wire shark

Example Project Ideas: I believe you all have great potential to undertake a novel and impactful project. While I encourage you to explore your creativity and come up with innovative ideas, I am sharing a few example ideas that you may consider for inspiration.

IoT-Integrated Smart University

Description: Create a smart campus with IoT devices are integrated and controlled centrally.

Features:

- ✓ Automated lighting and HVAC systems based on occupancy sensors.
- ✓ Centralized control panel for teachers to manage devices.
- ✓ Real-time monitoring of classroom conditions (temperature, air quality).
- ✓ Implement load balancing across multiple access points.
- ✓ Prioritize bandwidth for academic applications over recreational use.
- ✓ Monitor and analyze network performance in real-time.
- ✓ IoT-based smart meters to monitor real-time energy usage.
- ✓ Automatic switching to renewable energy sources like solar panels during peak hours.
- ✓ Optimize energy usage by controlling lights and devices in unused areas.
- ✓ GPS-enabled shuttle tracking for students.
- ✓ IoT-based parking management system to guide vehicles to available spaces.
- ✓ Traffic management using smart sensors to avoid congestion.
- ✓ Integrate IoT devices to monitor student participation in classes (e.g., biometric attendance, engagement trackers).
- ✓ Smart alarms integrated with a central control room, Automated evacuation route mapping based on the nature of the emergency, Real-time communication with first responders.
- ✓ A network that integrates wearable devices and IoT sensors to monitor students' health in real-time.
  Tools: Packet Tracer

Network Automation Using Python Scripts

Description: Implement basic network automation to configure devices in Packet Tracer using Python.

Tools: Packet Tracer

✛ Cybersecurity Awareness through Packet Tracer

Description: Simulate a secure network environment and demonstrate common cyberattacks such as ARP poisoning, DoS, or DNS spoofing.

Tools: Packet Tracer, Wireshark

✛ Multi-Tier IoT Network Performance Analysis

Description: Design and simulate a multi-tier IoT network using Packet Tracer, including edge, fog, and cloud layers. Measure latency, bandwidth utilization, and fault tolerance in the network.

Tools: Packet Tracer, Wireshark

✛ SD-WAN (Software-Defined WAN) Implementation

Description: Simulate an SD-WAN using NS3 to optimize application performance and reduce costs for a hybrid network. Compare SD-WAN efficiency with traditional WAN setups under varying traffic loads.

Tools: NS3

✛ Adaptive Network Traffic Routing

Description: Simulate a network in NS3 where routing dynamically adapts based on congestion and link quality. Test the efficiency of the adaptive routing algorithm against static protocols.

Tools: NS3

✛ Network Behavior Under Stress Conditions

Description: Simulate stress conditions (e.g., network overload, link failures) and study the behavior of routing protocols such as OSPF and EIGRP. Recommend protocol enhancements for handling stress conditions effectively.

Tools: Packet Tracer, Wireshark

✛ Real-Time Traffic Analysis with Wireshark

Capture and analyze live traffic of protocols like HTTP/3, TLS, or QUIC. Publish insights into protocol performance and emerging trends in network usage.

Tools: Wireshark

For further clarification, please contact your instructors.