Line Encoding Techniques

Objective:

Implement different line encoding and modulation schemes to visualize how digital data can be

Transmitted as electrical signals, ensuring error minimization and data integrity.

Key Line Encoding and Modulation techniques:

Digital signals(NRZ-L , NRZ-I , Manchester , Differential Manchester , AMI)

Analog signals(PCM , Delta)

Project Tasks:

Implement Encoding Algorithms: Write code for each encoding and modulation

Technique.

Graphical Representation: Display the encoded signal as a time vs. Voltage graph,

Showing transitions for 1s and 0s.

User Input: Allow users to input a binary sequence for encoding and amplitude sequence

For modulation.

Palindrome Analysis: It show the Longest Palindromic Sequence in the modulated signal.

Technologies Used:

Programming Language: Java

Toolkits: AWT (Abstract Window Toolkit) , Swing

This project will give insights into how digital data is prepared for transmission in networking and

Telecommunications and the trade-offs between various encoding and modulation techniques.

STEPS TO EXECUTE THE PROJECT

Step1: Before running any Java program, ensure that Java is installed on your system. You can verify

This by running the following command in your terminal or command prompt:

Java -version

Step2: Go to SignalGenerator.java file in the project at LineEncoding_Modulation/src/

SignalGenerator.java, as these file consists of main file.

Step3:Run this program to then turn to the terminal you will get a prompt with text Enter input type

(digital/analog): try to give the input in which you want to pass the signal parameters and press enter.

Step4:If you select digital give the binary input without spaces eg: 1011001. Else If you select analog

Give the amplitude values with space(NOTE: amplitude values must lie from -7 to 8) and press enter.

Step5:Now choose the encoding technique with scrambling requirement in case of digital signal

And modulation technique in case of analog signal , press enter.

Step6: This popup the JDK(Java Development Kit) with digital graph and Encode Signal with

Longest Palindrome string in terminal.

References:

Textbook and Algorithmic Resources: Introduction to Algorithms by Cormen, Leiserson , Class Notes.

Online Resources:ChatGPT , Claude.

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