

LINE ENCODING ENCODER AND SCRAMBLER

Introduction

Line coding is the process of converting digital data to digital signals. It refers to the waveform pattern of voltage or current used to represent the 1s and 0s of a digital signal on a transmission link. Data in the form of text, numbers, graphical images, audio, or video, are stored in computer memory as sequences of bits. Line coding converts a sequence of bits to digital signal. At the sender end, digital data is encoded into a digital signal and at the receiver end, the digital data is recreated by decoding the digital signal. The conversion involves three main techniques:

1. Line Coding
2. Block Coding
3. Scrambling

In this project I have implemented Line coding schemes including NRZ-L, NRZ-I, Manchester, Differential Manchester, AMI and scrambling techniques like HDB3 and B8ZS.

Software Implementation

I have used the numpy and matplotlib library which is available in Python3. Within this library we have various functions that are used:

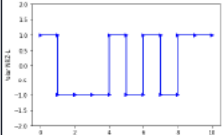
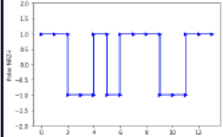
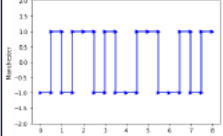
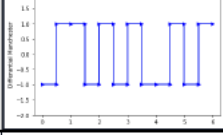
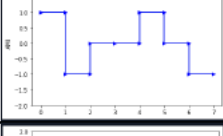
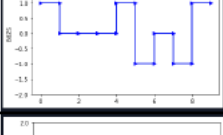
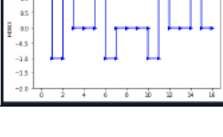
- Numpy arrays were used to store the bit stream and manipulate it to produce the correct digital signal.
- `matplotlib.pyplot()` : it is a collection of command style functions that make matplotlib work like MATLAB.
- The generated graphs were formatted using various in-built functions in the aforementioned libraries like `matplotlib.pyplot.plot()`

Instructions

The program first prompts the user to enter the bit stream. The data stream entered as input should not be space separated. The program would display a list of all the line coding schemes implemented and the user has to input the number corresponding to the scheme that he wants to implement.

Results

Table 1 enumerates the bit stream along with the outputs produced

Table 1: Results		
Bit Stream Entered	Encoding Scheme	Digital Signal Produced
1000101011	NRZ-L	
1010111001010	NRZ-I	
11001011	Manchester	
110010	Differential Manchester	
1100101	AMI	
100000000	HDB3	
1100001000000000	B8ZS	

Assumptions

1. The amplitude of each signal generated is considered to be 1 unit.
2. The digital signal is considered to have a positive logic.