

“ Line Encoder and Scrambler ”

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Introduction

Line Encoding is the method by which an analog/ or digital data is converted into an analog or digital electromagnetic signals for transmission via. wired or wireless transmission links.

Computer Communication uses both - Analog and Digital Transmission, depending upon the underlying media.

(Source - <http://computernetworkingsimplified.in/physical-layer/analog-signal-transmission-computer-networks/>)

The conversion involves three main techniques i.e.

- Line Coding
- Block Coding
- Scrambling

In this project of Data Communication,

I've implemented the various Line Encoding schemes such as **NRZ-I, NRZ-L, Manchester, Differential Manchester, AMI and Scrambling techniques** like - **HDB3 and B8ZS**

Software Implementation

Language - Python

Libraries Used - Turtle , Tkinter, Random and String

We have used '**Turtle**' library for graphical representation of output signals, '**Random**' library for generating the bits for input and '**String**' library for combining the bits to make a string.

How to run the program ?

When the program executes using Python3 it asks the user for the type of Input they would like to enter. There are mainly 3 types of Inputs and are as follows:

1. Completely random string
2. String with fixed subsequences
3. Completely manual input

Completely Random String is for generating any random bit pattern. **String with Fixed Subsequences** is for selecting the number of zeros and **Completely Manual Input** is for user to enter the desired bit patterns.

If the user opts 1 and 2, **the length of string** will be asked. If 2 is entered then the user is asked for **the number of zeros as the subsequences** as below:

1. 4 zeros as subsequence
2. 8 zeros as subsequence

After choosing one of the above, **the final Input string will be generated.**

After string generation, user will be asked to **choose the type of encoding scheme.** The different encoding schemes will be as follows:

1. NRZ - I
2. NRZ - L
3. Manchester
4. Differential Manchester
5. AMI

Choosing one of the above mentioned first four schemes, **the output which is a graphical representation is displayed in a new window.** The program terminates once the window is closed.

However, **on entering option 5 i.e. AMI**

The user is again asked to select from the following options for scrambling techniques:

1. AMI (without Scrambling)
2. B8ZS
3. HDB3

When the user types any of the above three (a, b or c) and presses enter the output in the graphical representation is displayed in a window. Finally, the program is terminated once the output window is closed.

References

Line Encoding using turtle referred from:

<https://github.com/OverPoweredDev/Line-Encoding-Plotter>

Longest Palindrome Algorithm is referred from:

<https://leetcode.com/problems/longest-palindromic-substring/discuss/900639/Python-Solution-%3A-with-detailed-explanation-%3A-using-DP>

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