# DATA COMMUNICATION

## AUTUMN : 2022

## ITT 305: PROGRAMMING ASSIGNMENT

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## TOPIC:LINE ENCODING ,DECODING &SCRAMBLER

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- **Language Used:** Python
- **Compiler :** Online Trinklet
- **Libraries :** matplotlib,numpy,collection
- **FUNCTIONS:**
    - **Encoding & Decoding:**
        1. Unipolar - NRZ
        2. Polar - NRZ-L
        3. Polar -NRZ -I
        4. Polar – RZ
        5. Biphase  Manchester
        6. Differential Manchester
        7. Bipolar AMI
    - **Scrambling Tech.**
        1. HDB3
        2. B8ZS

## EXECUTION STEPS:

- After successful compilation of code ,user will be asked to enter a binary string. Then enter a binary string.

```
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[+] Enter binary bits of any length :

>>>  1010000101010
```

- Press “Enter”. Then user will be asked to choose an encoding technique. You have to enter the respective number assigned to an encoder.

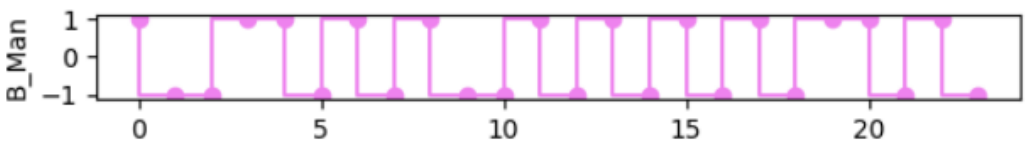
```
[+] Choose a Encoding Technique :
 1) Unipolar-NRZ
 2) Polar-NRZ-L
 3) Polar-NRZ-I
 4) Polar-RZ
 5) Biphase Manchester
 6) Differential Manchestor
 7) Bipolar AMI
>>>  5
```

- Press “Enter”. The user will be asked whether he/she wants Decoding the input signal or not. If you enter “Y” – decoded signal will be shown with graph else if you enter “N” then not shown.

```
[+] Do You Want to decode the Digital Signal to Binary (Y/N
>>>  Y
```

- Press ”Enter”. Then user will shown Decoded Signal with Graph of Encoded Signal

```
Decoded Signal : [1, 0, 1, 1, 1, 0, 0, 0, 0, 0, 1, 1]
```



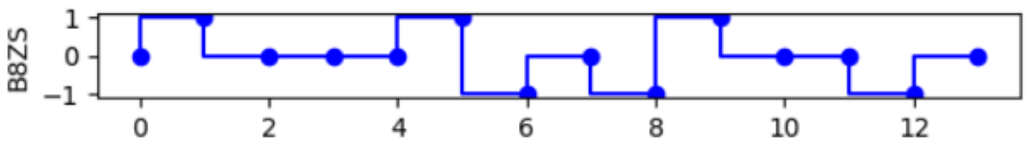

- **Graph:**
  - **Y-AXIS :** It represents the levels of the voltage (-1 , 0 ,1) according the respective choosen technique.
  - **X**-AXIS: It represents the duration of each input bit .

**SPECIAL CASE:**

- If you choose option 7 (AMI) for encoding , if string contains consecutive more than 8 zeros , you will be asked to choose a scrambling method .
  1.HDB3
  2.B8ZS
  After choosing a technique you will be shown decoded signal and graph.

```
[+] Please choose a Scrambling Method
 1) HDB3
 2) B8ZS
 >>>  2

[+] Do You Want to decode the Digital Signal to Binary (Y/N)
>>>  y
Decoded Signal : [1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0]
```




**REFERENCES:**


https://trinket.io/embed/python3/f03e855da4

https://github.com/OverPoweredDev/Line-Encoding-Plotter/tree/master/python_implementation

https://www.geeksforgeeks.org/manchester-encoding-in-computer-network/