

Assignment: Data Communication

Team Members

- **Kanchan** (2022BITE021)
- **Muskaan Choudhary** (2022BITE009)
- **Samiksha** (2022BITE023)

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Objective

Implement a digital signal generator.

Language and Libraries Used

- **Programming Language:** Python
- **Libraries:**
 - `matplotlib`: Used for plotting encoded waveform.
 - `numpy`: Used for numerical operations, particularly for creating the time vector for accurate plotting.

Bit Rate

The bit rate is given in bits per second, determining the time interval for each bit.

Plotting Assumptions

- The x-axis (time) is calculated based on the bit rate and the length of the input data.
- A step plot is used to simulate the discrete nature of digital signaling.
- The user selects an input type: analog or digital. For digital input, an encoding scheme (NRZ-L, NRZ-I, Manchester, Differential Manchester, AMI) can be chosen.
- If AMI is selected, optional scrambling (B8ZS or HDB3) can be applied.
- For analog input, the user selects PCM or DM to convert the signal to digital, which can then be encoded.

Assumptions

- In Differential Manchester, we assume that the last level of the signal is 1.
- In Delta Modulation, we take the value of the Nyquist rate as 2.
- In Delta Modulation, we take the value of delta epsilon as 0.2.
- In NRZ-I, we assume that the last level is -1.

How To Run The Project

NOTE: You should have Python 3 installed on your system.

Clone the GitHub Repository

```
git clone https://github.com/kanchan-12345/digital-line-encoder.git
cd digital-line-encoder
```

Install Required Libraries

```
pip3 install numpy matplotlib
```

Run the Main File

```
python3 main.py
```

References

- <https://github.com/arasgungore/PCM-and-DM-modulators/blob/main/main.ipynb>
- <https://chatgpt.com/c/67337dc6-0930-8001-b373-fc3649ab955b>