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# SIMULATION OF TEXT DATA TRANSMISSION OVER AN AWGN

**COURSE CODE : CS571**

**COURSE NAME : PROGRAMMING PRACTICUM**

November 22, 2022

# Today's Agenda

- Title of project
- Components
- Input and Output Data
- Result

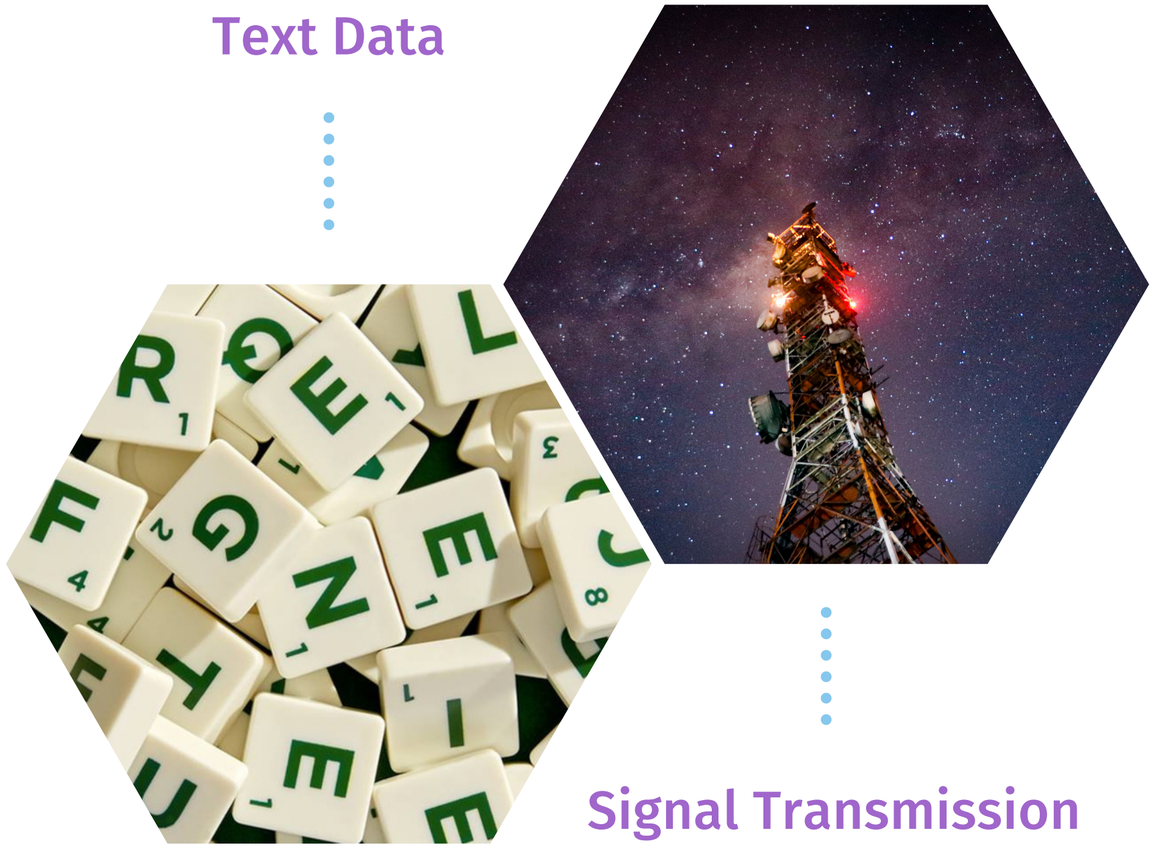
November 22, 2022

# TITLE OF PROJECT

## Simulation of text data transmission over an AWGN (source coding and error-correction coding included)

The goal of this project is to detect transmitted data suffered from AWGN during transmission.

Text Data



Signal Transmission

# Data Used

## Input and Output Files

- **Input File**: It would be a text file which we want to transmit after adding a noise.
- **Output File**: After decoding, we will write decoding text into a text file.

01 Signal Encoder

02 Channel Encoder

03 Modulation

04 Addition of Noise

05 Demodulation

06 Channel Decoding

07 Signal Decoder

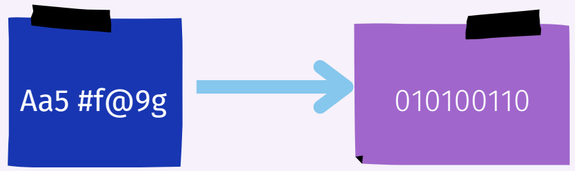
# Components

We can divide whole process into 7 major components

# COMPONENTS

## SIGNAL ENCODING

- Converting Text data to binary data
- Technique used : Fixed length Encoding
- In fixed-length encoding, all the letters/symbols are represented using an equal number of bits.




01 **SIGNAL ENCODING**

02 CHANNEL ENCODING

03 MODULATION

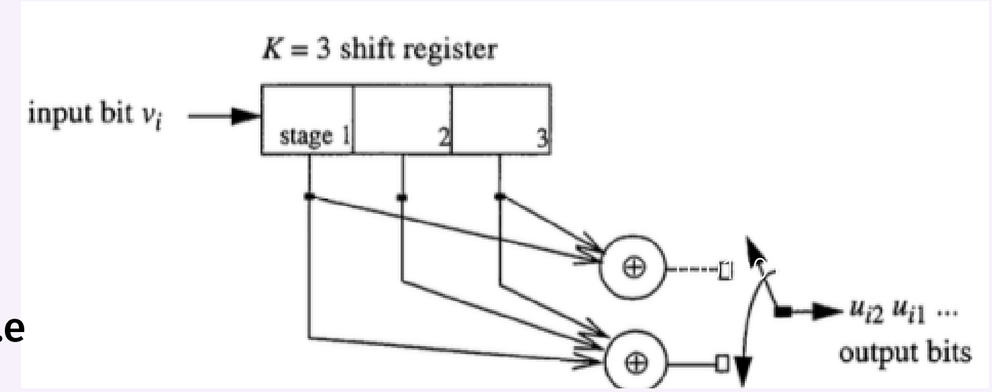
04 ADDITION OF NOISE

05 DEMODULATION

# COMPONENTS

## CHANNEL ENCODING

The goal of channel coding is the opposite in the sense that it adds redundancy to a bit stream which allows the detector at the receiver to detect and/or correct errors which might have been introduced during transmission and here we used Convolution Coding Technique with K=3 i.e with 3 Shift Registers

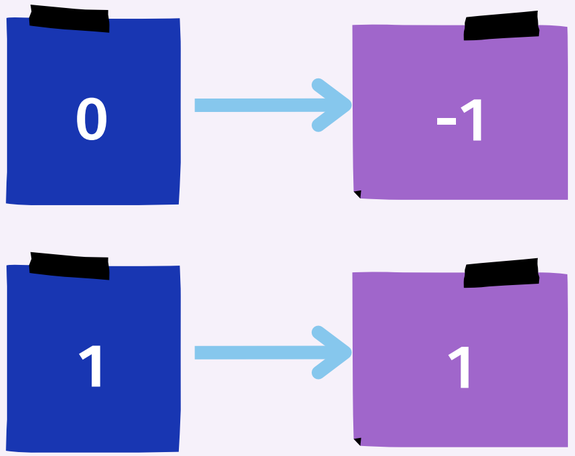


# COMPONENTS

## MODULATION

- To Transmit the signal we need to modulate it first.
- Modulation technique:

  if  n is input which is binary (either 0 or 1)
  then output would be (2^n - 1)




01 SIGNAL ENCODING

02 CHANNEL ENCODING

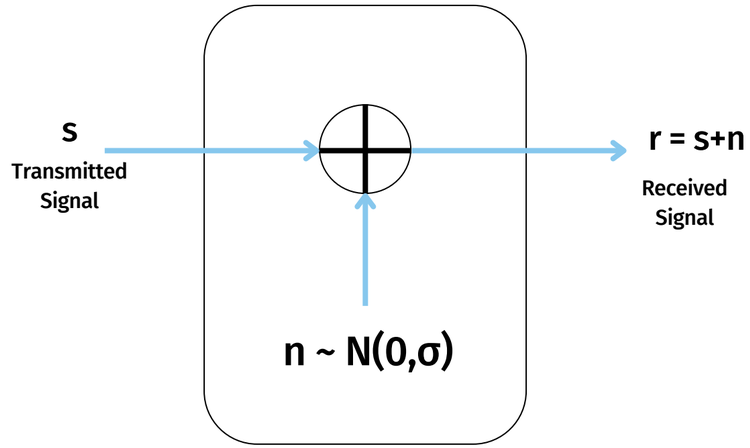
03 **MODULATION**

04 ADDITION OF NOISE

05 DEMODULATION

## ADDITION OF NOISE

- The noise we are adding to test our technique is Additive White Gaussian Noise.
- We will add this AWGN (n ~ N(0,σ)) to our transmitted signal and we will get our received signal after adding noise.



## DEMODULATION

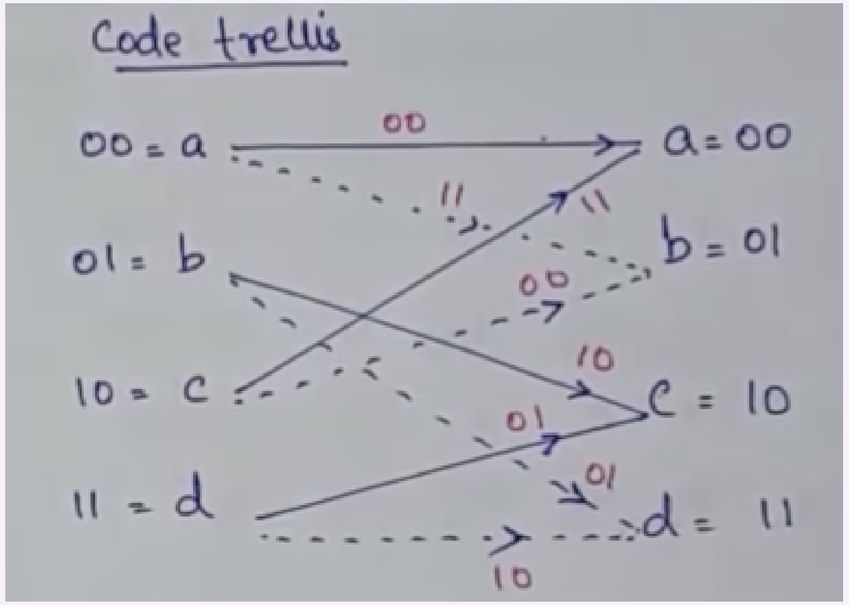
- After we get received signal, we want it back in binary form to further decode it.
    - If our input is less than 0, output would be 0
    - If our input is greater than 0, output would be 1.

| INPUT (r) | OUTPUT (s) |
|---|---|
| r<0 | s = 0 |
| r>0 | s=1 |

# COMPONENTS

## CHANNEL DECODING

Channel decoding is performed at the receiver after demodulation and prior to source decoding to attempt to resolve these errors. Hence Viterbi Algorithm (using Trellis Diagram) is used to do the Channel Decoding



## SIGNAL DECODING

**According to signal encoding dictionary, we will decode whole message from binary type to back in text file. i.e decoding fixed length coded part.**

# RESULT

- We have to show how much our technique is correctly detecting the text after adding some noise into it.
- For showing that we have find:
  - Wrong Detections: Number of words detected wrongly by our code.
  - Less value of Wrong detection means detection is good.

November 22, 2022

# THANKYOU FOR LISTENING!!!