INFORMATION THEORY

Project

IITU, ALMATY, 2019

Communication system

Communication System

Information Source → Message Signal → Transmitter → Transmitted Signal → Channel → Received Signal → Receiver → Message Signal → User of Information
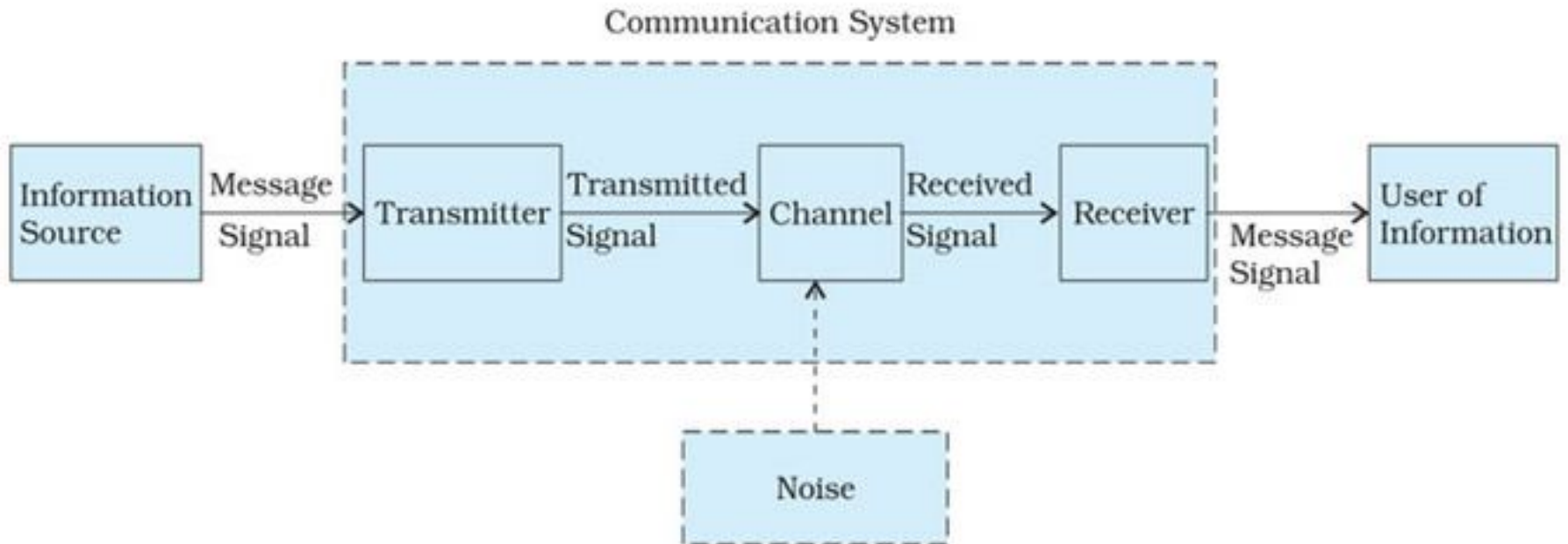
Noise

Communication system

- Noise

  Noise refers to the unwanted signals that tend to disturb the transmission and processing of message signals in a communication system. The source generating the noise may be located inside or outside the system.
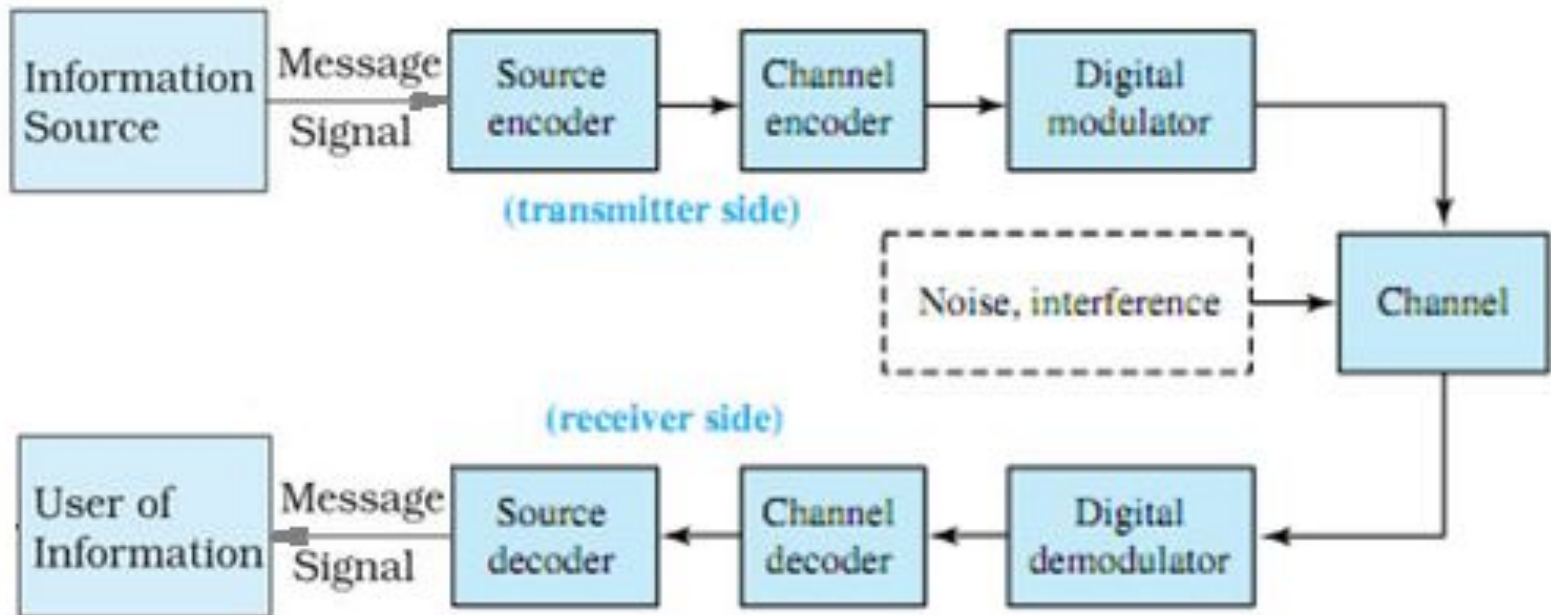
- Transmitter

  A transmitter processes the incoming message signal so as to make it suitable for transmission through a channel and subsequent reception

- Receiver

  A receiver extracts the desired message signals from the received signals at the channel output.
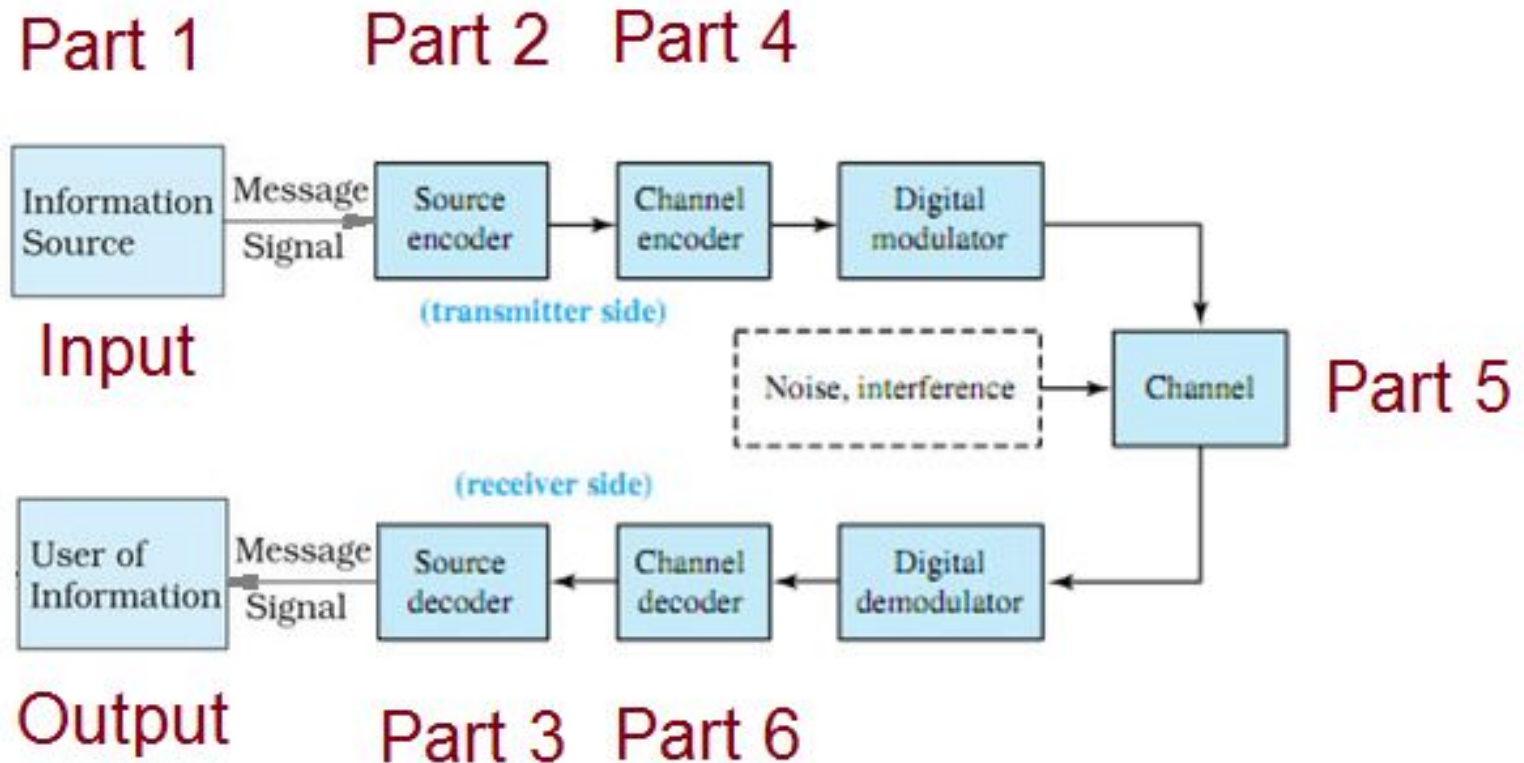
Communication system

Project Plan

- Groups: 3 students

- 7 weeks – 6 parts & defense (with report)

Project structure

Part 1

- Input: "Text.txt" file (English text).
- Goal: C++ (or another) program finds all symbols (not only letters) in this text and computes their probabilities.
- Outpit: list of all unique symbols from the text with their probabilities.

  Example:

  A – 0,014

  B – 0,012

  …

Part 2

- Input: "Text.txt" file and the result from Part 1.

- Goal: Encode the text from the "Text.txt" file using Shannon-Fano or Huffman algorithm with probabilities from Part 1.

- Output: a sequence of binary digits.

  Example:

  101101011…

Part 3

- Input: a sequence of binary digits from Part 2.

- Goal: Decode back into text the result binary sequence after Part2 (Shannon-Fano or Huffman code).

- Output: a text identical to an initial text from "Text.txt" file.

Part 4

- Input: a sequence of binary digits from Part 2.

- Goal: Encode the result binary sequence after Part2 (Shannon-Fano or Huffman code) with Hamming code.

- Output: a sequence of binary digits ready for error-correction.

Part 5

- Input: a sequence of binary digits from Part 4.

- Goal: Add errors to the result binary sequence after Part4 (Hamming code) with a certain interval.

- Output: a sequence of binary digits after Hamming code with artificially created errors.

Part 6

- Input: a sequence of binary digits from Part 5.

- Goal: Decode Hamming code and fix errors.

- Output: a sequence of binary digits identical to an output sequence from Part 2.