REPORT

Zajęcia: Analog and digital electronic circuits
Teacher: prof. dr hab. Vasyl Martsenyuk

Lab 7
Date: 21.12.2024
Topic: 7. Signal sampling and reconstruction: analysis of aliasing effects and correct signal reconstruction. 8. Encoding and decoding of digital signals: application of compression algorithms in practice.
Variant 7

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1. Problem statement:

Solve the tasks for:
- sampling and reconstruction
- coding and decoding

2. Input data:
Variant 7: Apply DCT to the signal [10, 20, 30, 40, 50, 60]
and reconstruct it with a threshold of 15.

3. Commands used (or GUI):

Link to remote repostorium: https://github.com/sensorbtf/Digital-signal-processing

4. Outcomes:

```
In [1]: runfile('D:/Sources/Digital-signal-processing/Zadanie 7 i 8 - wariant 7/Zad7i8.py', wdir='D:/Sources/Digital-signal-processing/Zadanie 7 i 8 - wariant 7')
Original Signal: [10 20 30 40 50 60]
Compressed Signal: [ 85.732141   -41.62561796  0.          0.          0.
   0.        ]
Reconstructed Signal: [11.79 18.01 28.78 41.22 51.99 58.21]

In [2]:
```


Signal Sampling and Reconstruction
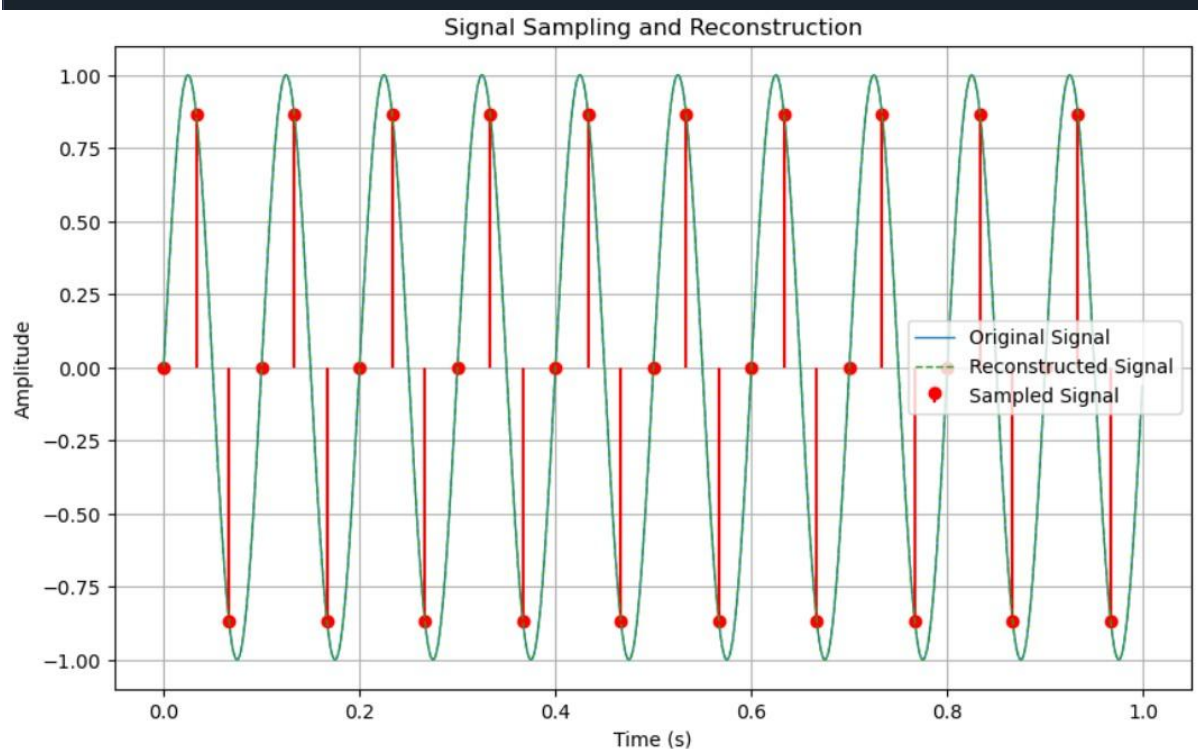
5. Conclusions:

Proper sampling frequency ensures accurate reconstruction without any distortion or loss of information. This experiment validates the Nyquist-Shannon theorem and the role of high sampling rates in signal fidelity.

DCT is an effective method for compressing signals, allowing for data reduction with minimal quality loss. A proper threshold selection is critical for balancing compression efficiency and reconstruction fidelity.