DSP HW2.

Quantization and analog-to-digital conversion

Kamil Akhmetov, B17-DS-01

Goal

The goal of the assignment was to analyze quantization of raw data about voltage and processing of the signal to achieve noize reduction. As a result we have a voice sample with legible speech.

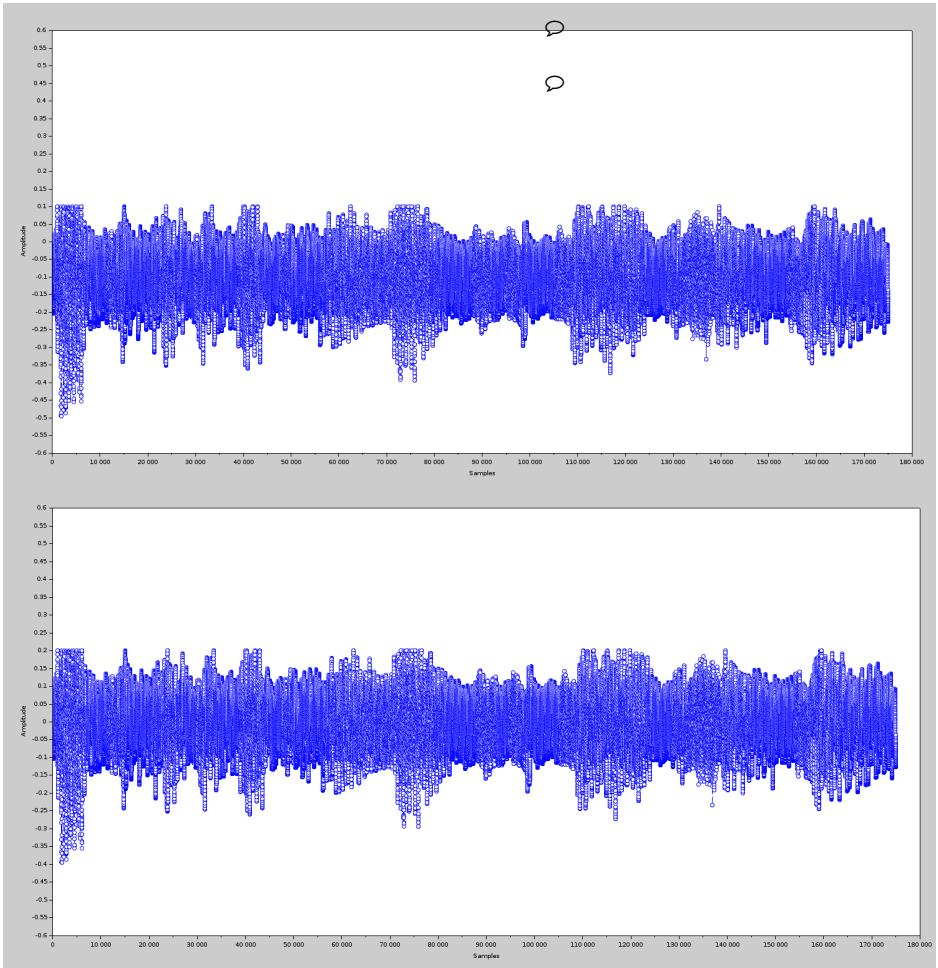
Steps

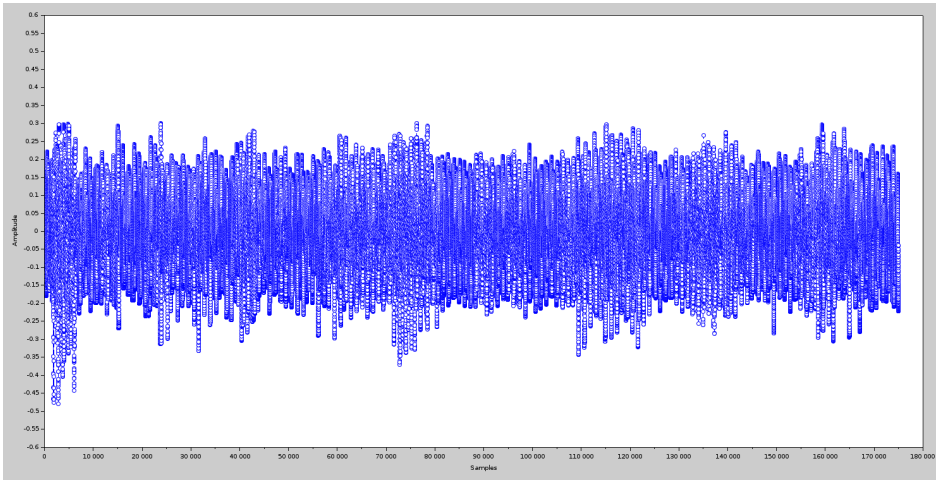
All the values are found empirically.

- **Quantization** - mapping from continuous set of values to the set of quantum levels
  Ended up with $\{-0.5, -0.5005, -0.5010, . . , 0.1\}$
- **Frequency of sampling** - how many times the signal is recorded in 1 second.
  Ended up with $fs = 50000$
- **Amplitude shift** - to balance value by compensating shift from 0
  Ended up with a value of 0.1
- **Eliminating sinusoidal interference** - to compensate noize we subtract sinusoidal waveform
  Ended up with frequency as 165Hz and amplitude as 0.1

Plots

X axis - Samples, Y axis - Amplitude




Amplitude
Samples
0.6
0.55
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
-0.2
-0.25
-0.3
-0.35
-0.4
-0.45
-0.5
-0.55
-0.6
0
10 000
20 000
30 000
40 000
50 000
60 000
70 000
80 000
90 000
100 000
110 000
120 000
130 000
140 000
150 000
160 000
170 000
180 000