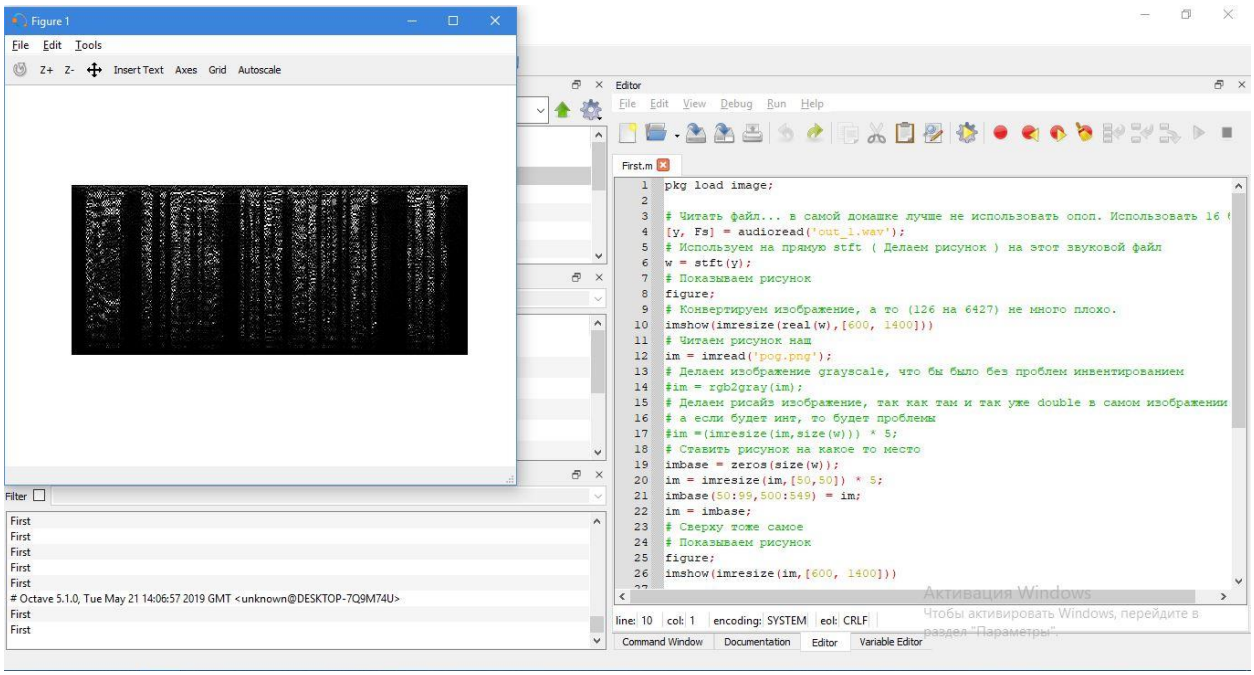
Digital Signal Processing

Lab 4: Short-Time Fourier Transform

Vladislav Paskevits

1. Find or record a .wav file of your choice (preferably mono sound and 16bit) and perform the following:
    a. Perform STFT on the audio file



b. Plot the spectrogram, include both the real and imaginary components (Plot it as a heatmap or image).

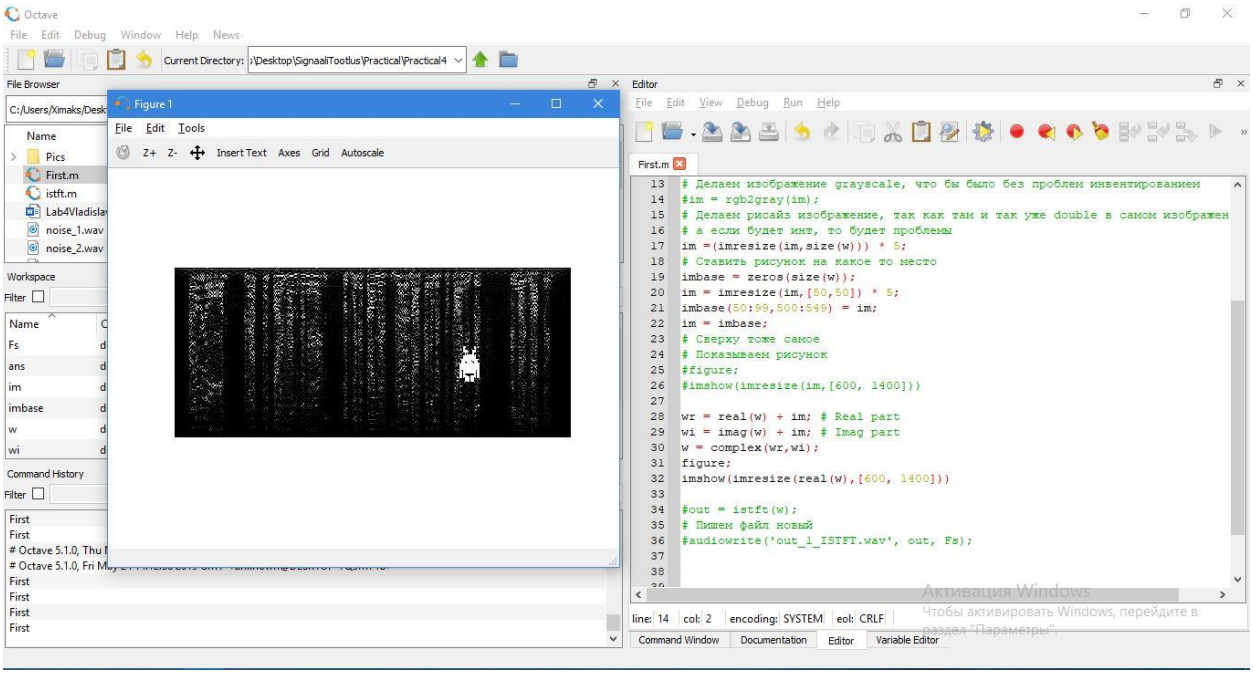


Figure 1 Real-Imaginary parts (Complex)

c. Try to add an image of your choosing into the spectrum data (Add the real and imaginary components separately).

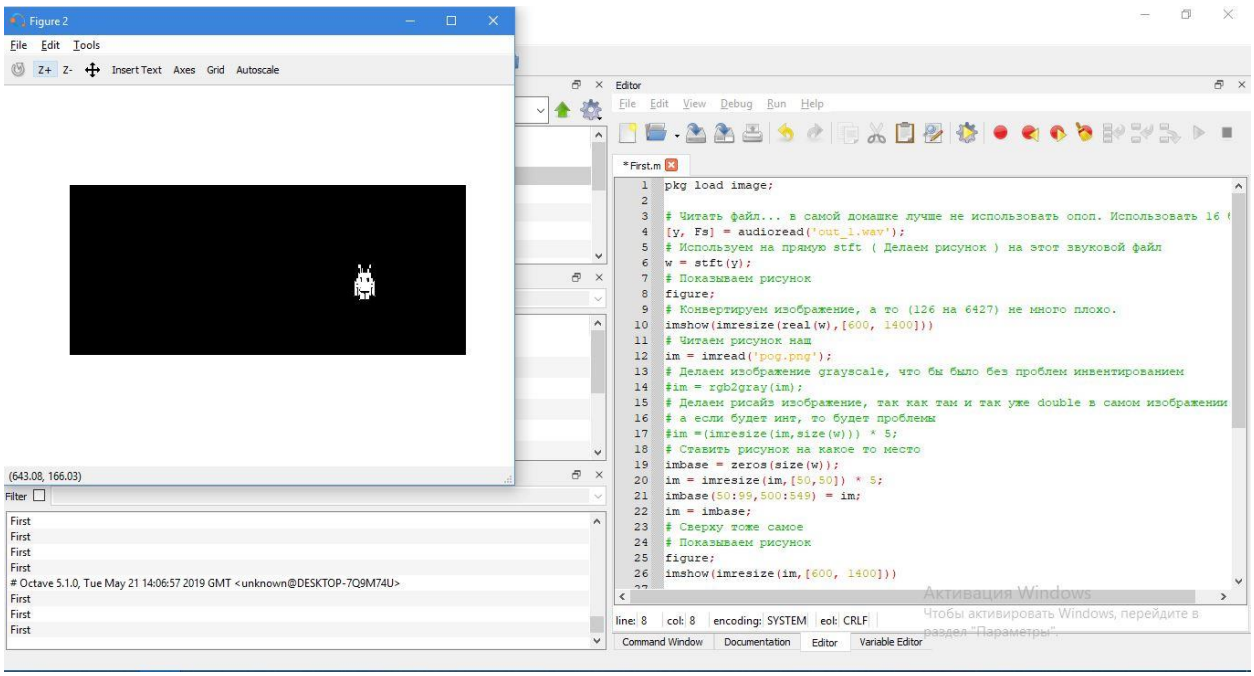


Figure 2 Picture to be added

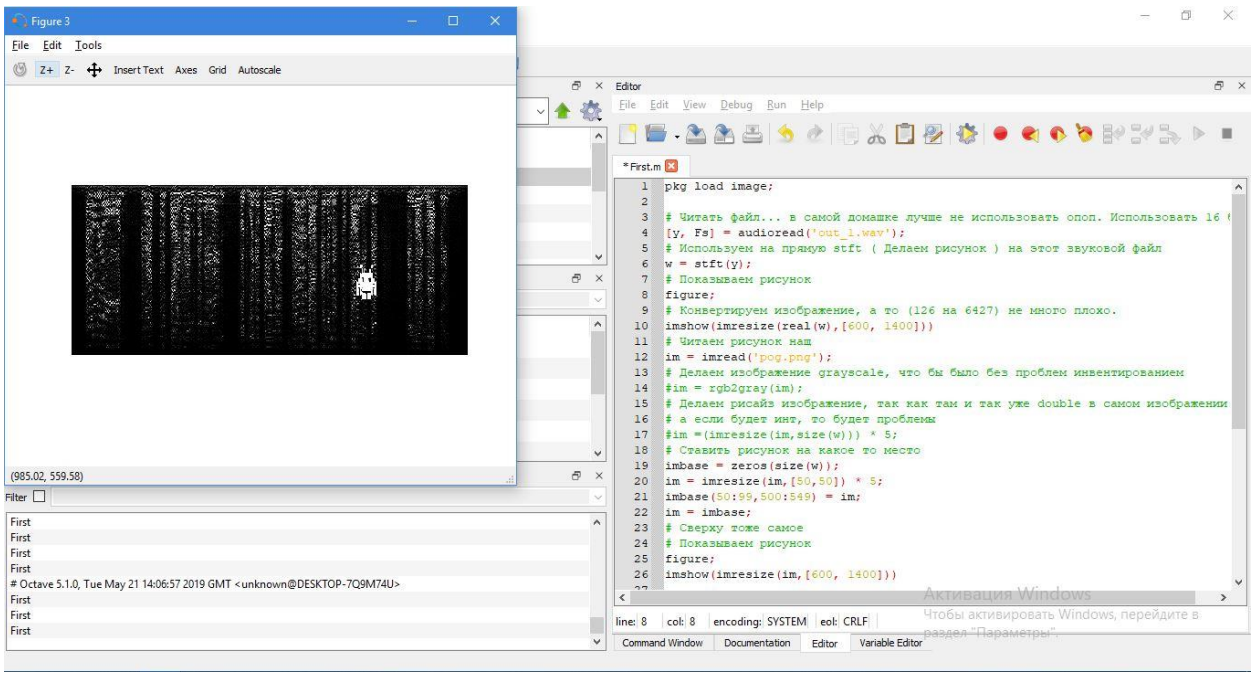
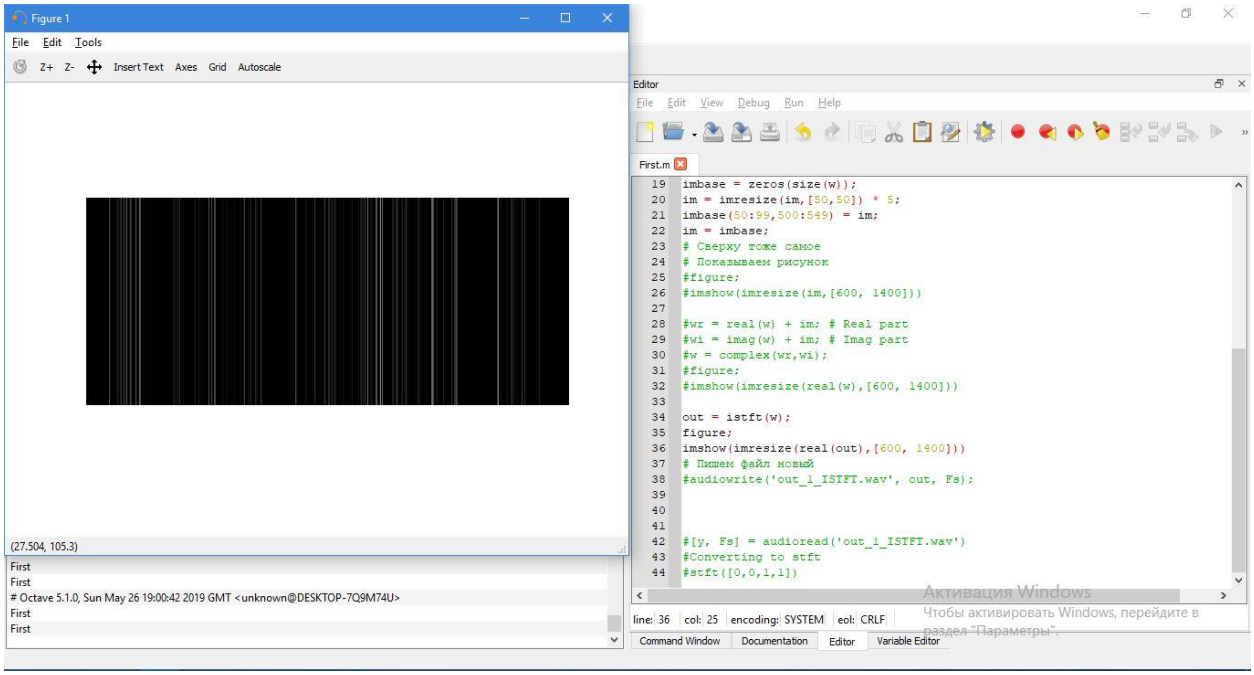


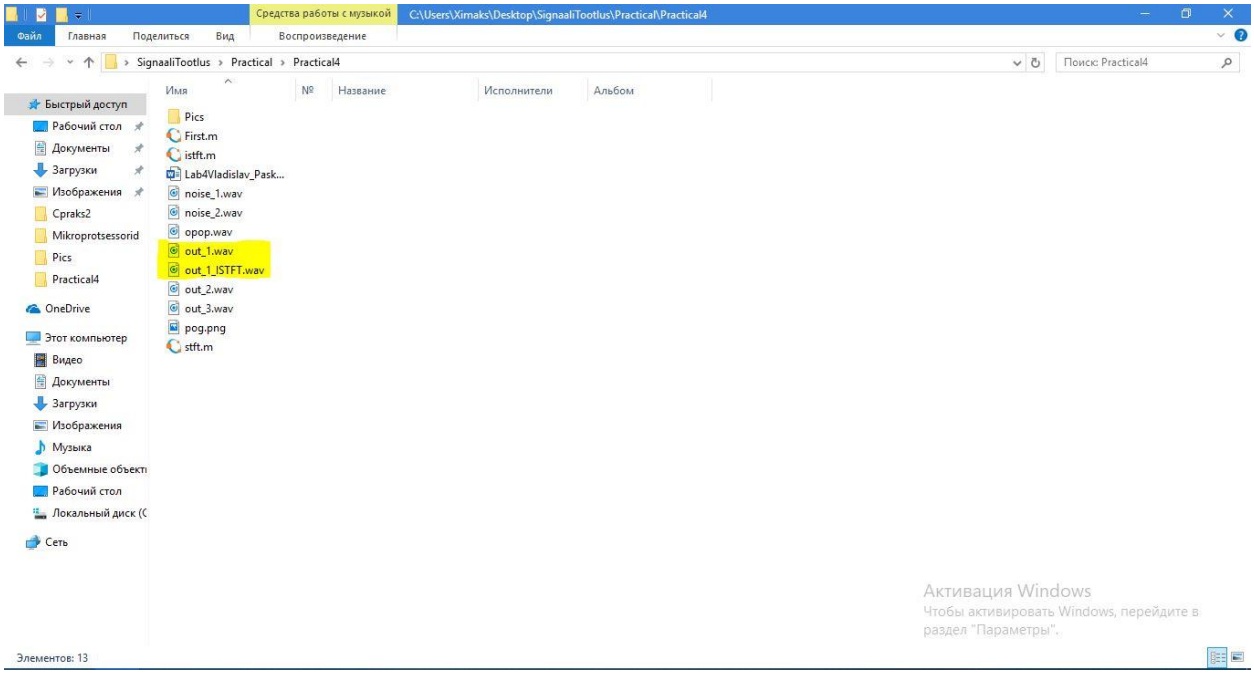
Figure 3 Picture that are added

d. Perform Inverse STFT to get the new altered signal

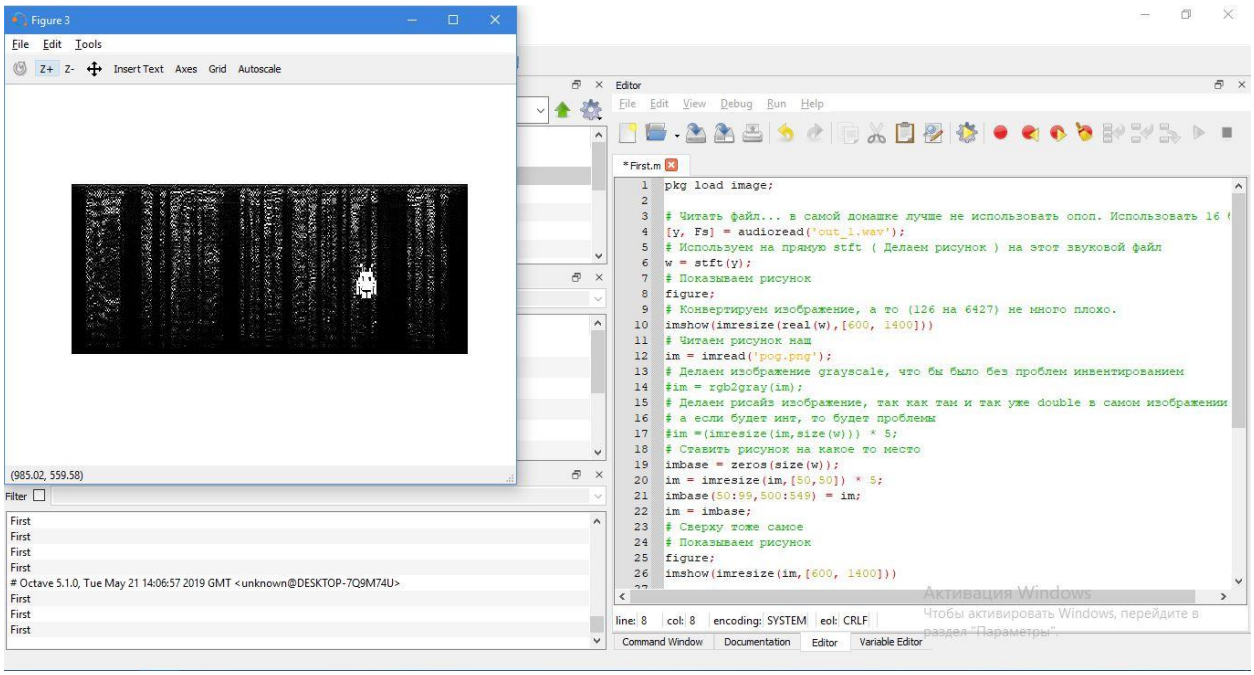


.

e. Save the audio file and make sure you can still hear most of the original audio.



f. Read in the new file, perform STFT and plot it. Is the image still there?



2. Find an audio file online that has a hidden image:
    a. Perform STFT on the audio file.
    b. Plot the spectrogram, exposing the hidden image

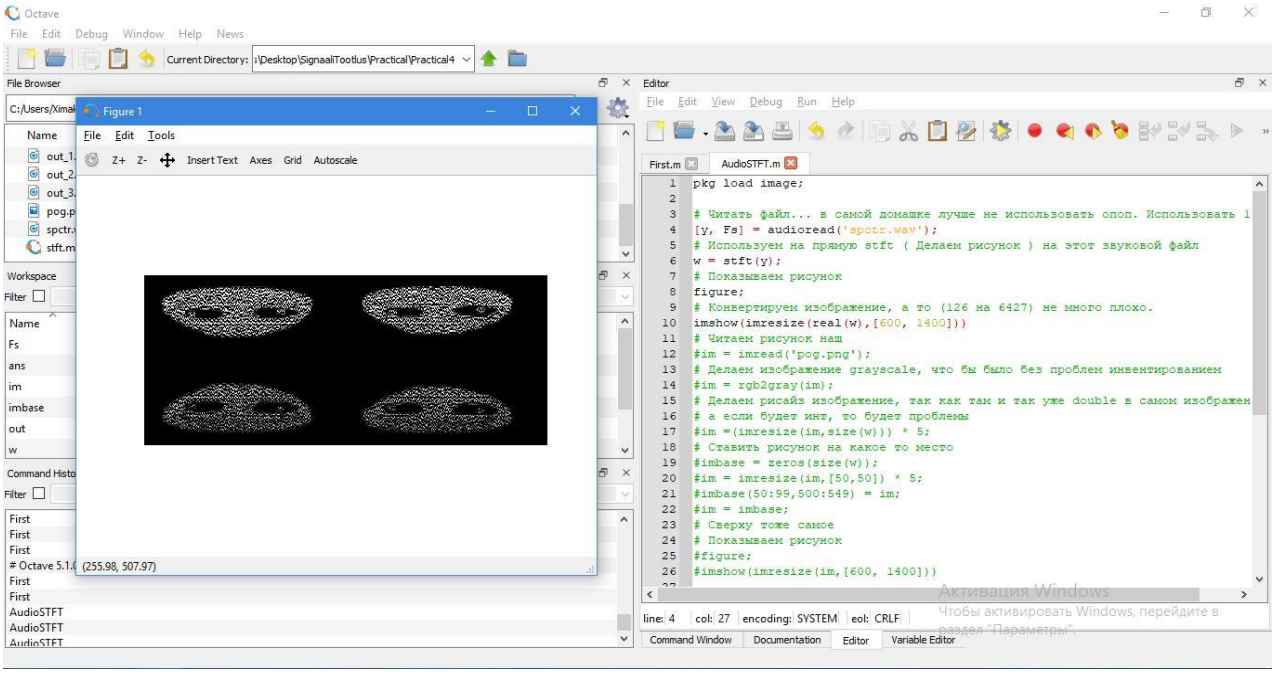


Figure 4 STFT

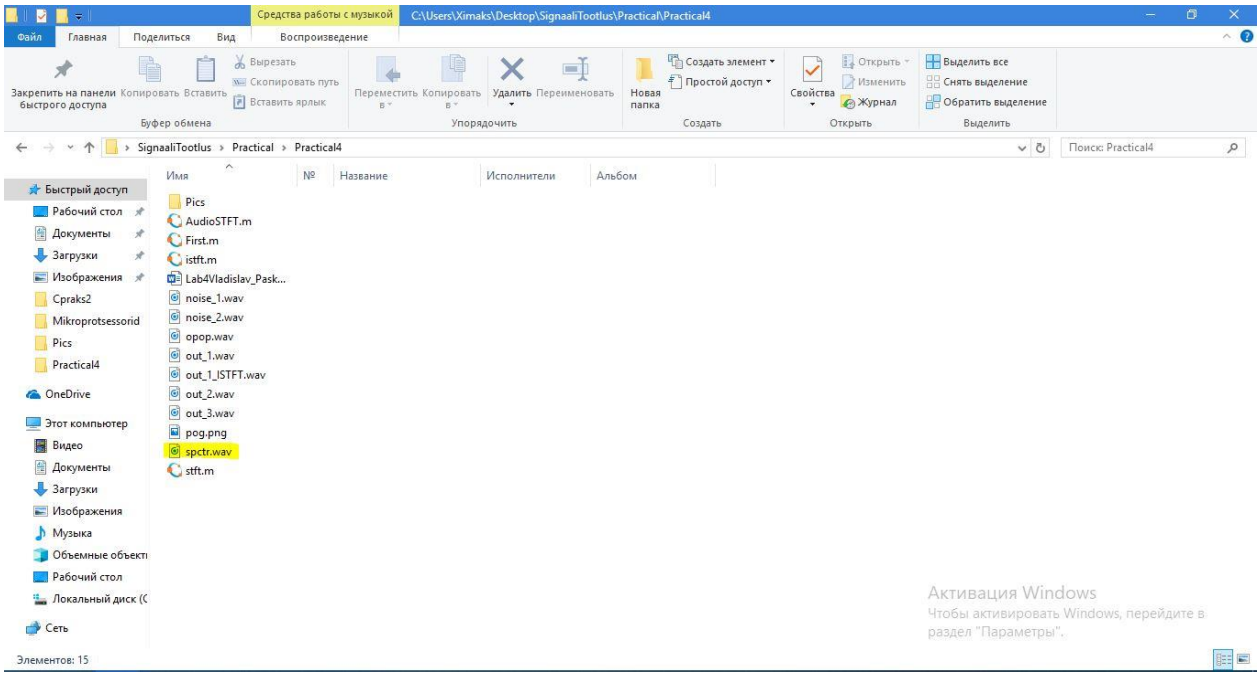


Figure 5 File