Signals and Systems Laboratory
Indian Institute of Technology Jammu
Experiment No.-10

Objective-
(a) Take x(n) on your own voice. Compute energy of overall speech signal and segment wise of speech signal, respectively. Plot energy vs segment.
(b) Generate a synthetic signal by adding two signals sin(2π50t)+ sin(2π120t). Add noise of 50 Hz and 2000 Hz, amplitude of 0.25 to the signal. Plot it both signal and signal+noise in time-domain. Plot the magnitude response of the synthetic signal, noisy signal of 50 Hz, and noisy signal of 2000 Hz.
Apparatus- python+matplotlib, Matlab.
Theory-
Energy of Speech Signal:
The energy of a speech signal refers to the overall magnitude or strength of the signal. The energy E of a discrete-time signal x[n] can be computed by,

$$E = \sum_{n=0}^{N-1} |x[n]|^2$$

Where E = energy of the signal, x[n] = signal amplitude at time index n, N = total number of samples in the signal.

Observations-
Result- Computed energy on overall speech signal and segment wise of speech signal, respectively. Generated a synthetic signal by adding two signals. Added noise to the signal. Also plotted both signal and signal+noise. Designed low pass and high pass filter to remove 2000 Hz and 50 Hz noise respectively.
Precautions:-

- Program must be written carefully to avoid errors.

- Programs can never be saved as standard function name.

- Commands must be written in proper format.