Lab 1: Getting Familiarized with GNU Radio

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Task 1: Happy Birthday Song

- Synthesize the tune for "Happy birthday to you" on GNU Radio on a repeat loop.
- The piano notes for this tune are:

  C,C,D,C,F,E;
  C,C,D,C,G,F;
  C,C,C*,A,F,E,D;
  A#,*A#*,A,F,G,F;

Each note corresponds to a certain frequency. For example, the standard C corresponds to 262Hz. Similarly you can look up the remaining frequencies online.

Task 2: Music Synthesis

to add two signal we must have both the signals sampled at same rate

- You have been given two audio files – background.wav and vocal.wav. The former contains the background score for a song, sampled at 44.1 kHz, and the latter contains the vocal component, sampled at 32kHz.
- Your task is to coherently combine the two audio files and re-create the music clip.

Task 3: Equalization

using band pass filter we can

- Build an equalizer in GNU Radio for music.
- An equalizer allows one to tune the gain/amplification in different frequency bands: https://en.wikipedia.org/wiki/Equalization_(audio)
- Use the following bands:
  20Hz – 500Hz, 500Hz – 3kHz, 3kHz – 6kHz, 6kHz -9kHz, 9kHz – 15kHz.
- You should have a GUI with a slider for adjusting the gain on each band.
- Use the audio clip Bach.wav (sample rate 48kHz) to demonstrate your equalizer.

Task 4: De-Noising audio

noise contain high frequency components
and low pass filter is used for this

- You are provided a noisy and corrupted audio signal in the form of the file shor.wav (sample rate 44.1kHz).
- Your task is to denoise and extract clear audio out of this clip.

Hint: You might want to visualize the spectrum of the clip first.