Project: Synth Challenge 2017

Multimedia Signal Synthesis

CTU

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Introduction:

Work assignment:

a) Synthesis of the arbitrary instrument for the composition „**Flight of the Bumblebee** "by *Nikolaj Rimskij Korsakov*.
b) Two octaves of the major scale for one chosen instrument from the previous synthesis.
c) Arbitrary realization of audio signals in MATLAB.

Results:

a) **Task 1:** Synthesis of the arbitrary instrument for the composition

For this task, the first thing I have done has been to choose a musical instrument. In my case I have chosen the clarinet, which corresponds to number 72 in the standard MIDI table. In addition, this instrument corresponds to additive synthesis. Once this is known, in the Matlab program 'shynt_sergio.m' I created the instrument with the following parameters.

```
clarinet
-----------------------------------
k        | A        | n        | tau
-----------------------------------
1.0000   | 1.0000   | 0.7500   | 0.7000
2.0000   |       0  | 0.7500   | 0.7000
3.0000   | 0.5000   | 0.7500   | 0.7000
4.0000   |       0  | 0.7500   | 0.7000
5.0000   | 0.2000   | 0.7500   | 0.7000
```

After, the sound of the clarinet is created to apply a Butterword filter to the signal produced. I have chosen to make this type of filter and not a Chebyshev or elliptical filter because this filter has a better response in the phase. Because if we compare it with the Chebyshev filter, we can say that the Butterword filter is better because it lessens the signal.

Finally, to listen to the audio created from the synthesis of the file 'Bumble01.mid', we have to execute the Matlab program 'main.m' so that it sounds through the clarinet. The file obtained is **'Bumble01.m4a'**.

b) **Task 2:** Two octaves of the major scale for one chosen instrument from the previous synthesis.

This task is executed only from the program 'main.m' because this part makes a call to the program 'shynt_sergio.m' so that it executes two octaves with the clarinet.

To create these tones, a frequency vector has been created with 14 values to which we will calculate its fc by means of the formula of the file 'midi2freq.m'. Then we just have to apply that value of fc to the program " of the previous task so that it sounds with the clarinet. The file obtained is **'Task2.m4a'**.

c) <u>Task 3:</u> Arbitrary realization of audio signals

For the realization of this practice, I have first made a sound that looks like a laser gun. To do this, I have taken 36 harmonics to define k as the root of j so that the added frequency is closer. Then I have only applied one sine to each harmonic and I have added it to the previous value, thus creating the file 'Task3_part1.m4a'.

Then, I have downloaded a song of Star Wars, 'imperialmarch.m4a' with the purpose of joining both sounds. To put the two songs together, I have taken the frequency of the show and the time each song has and I shortened the longest song so that both sounds have the same solution. Finally, I have added both signals of the same size, and I have created the final sound **'Task3_final.m4a'**.