

OBL 4101 – Project on voice coder (vocoder) –

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# Introduction

Audio processing in analogue and digital domains has begun long time ago, having as origins the mechanical recoding devices and old telephony. Even if we can still find traces of these old methods, the Digital Signal Processing audio technologies have evoled a lot since then and they are using algorithmic and mathematical tools, which have a considerable effect on nowadays society. One essential human ability is the ability to perceive and interpret sound. It provides cues for visual perception, situational and geographical awareness, and, most importantly, the capacity for interpersonal communication. Therefore, audio processing has an important role in the engineering field.

This project aims to present different ways of audio processing using Matlab and is based on 4 main parts. In the first part we are going to modify the speed of the voice for different audios without changing the pitch, in the second part of our project we will modify in contrary the pitch of the voice without changing its speed and in the third part, we will apply ring modulation on the voice in order to make it seems like a robot voice. In addition, we have a last part in which we experimented with different filters and audio processing methods on the sounds and displayed and compared the result. [1]

# I.Modifying the speed of the voice without changing its pitch

# II.Modifying the pitch without changing the speed

# III. Robotization of the voice

The robotization of the voice is obtained by using ring modulation. In DSP, modulation means that one signal influences the amplitude of another. RM was first used in radio receivers to carry signals, but was later used as a musical effect, first heard on Harakd Bode's Melochord (Pavlov, 2011). RM became recognized for creating unique metallic alien noises, which were most famously utilized as an effect on the voices of the Daleks in the TV show 'Doctor Who' and are currently employed in a variety of sound and music productions, but it can be used as well for robotization of a voice. [2]

RM is produced by combining two signals, one of which is the modulator carrier signal and the other an input signal. The output signal contains the difference and sum of the frequencies of the two original multiplied signals, which we refer to as the upper (USB) and lower sidebands (LSB).

In the program “robo.m” we intended to create a function that is taking as input the speech of someone and is transforming its voice ina robot voice with the help of ring modulation.

# IV.Special effects

# Conclusion

# References

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| [1] | D. P. Hill, Audio and Speech Processing with MATLAB, 2018. |
| [2] | Unknown, "THE RING MOD: MULTIPLE RING MODULATION EFFECTS," *Digital Audio Systems,* 2017. |