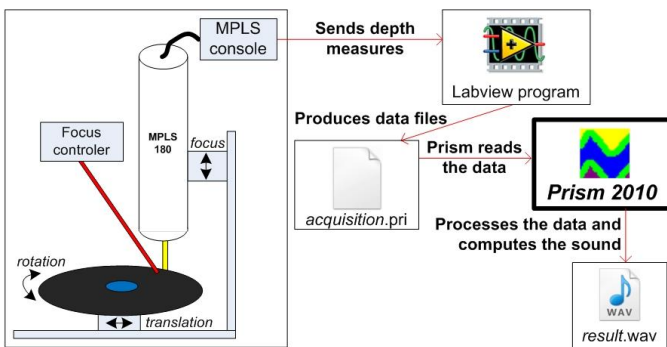


Context

Sound archives have to deal with a quantity of old recording media, such as discs or cylinders. Some of them cannot be read anymore with classical playback systems. Indeed, the stylus could damage the media or the cracks and cuts on the disc would prevent the stylus from following the groove properly. Started several years ago, the project allows therefore restoring the sound from such media, without touch.



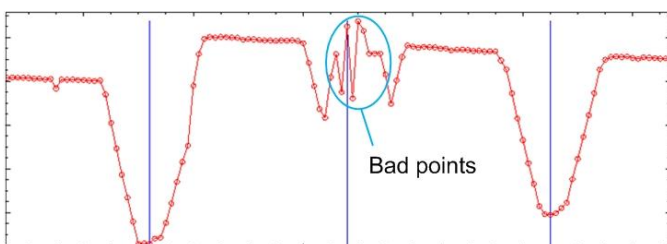
The acquisition process

The acquisition of the data is performed through a complex optical system which computes the depth of the disc and reveals the grooves, disc top and bottom, in 3D. Combined with Labview, data files are produced and Prism 2010, the C# software, processes that data in order to compute the sound.

The goal of this project is to enhance the sound quality by especially improving the algorithms. Tobias Müller, a colleague of EIA-FR worked on the same project and improved the quality of the acquisition to achieve the same goal.

Groove center position

Many algorithms, data structures and parameters are used to estimate the stylus position on the grooves. Particles of dust, cracks, stripes or reflections on the disc will also be measured by the probe.



Section representing grooves, one with bad points

The algorithm has to deal with such erroneous information. Estimating groove center is the key part of the process. Sometimes, because of the bad points, inaccurate groove centers are computed. This adds noise in audio files.

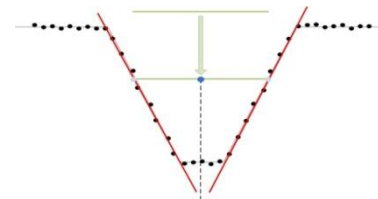
Functional improvements on Prism 2010

The processing program, Prism 2010, has been deeply analyzed. It allowed to correct bugs and code inconsistencies.

The program has also been slightly refactored to allow a better productivity in the further steps.

Slope detection improvements

To get a good sound quality, it is important to compute an extremely precise groove center position. "Fit Line" is an algorithm which drops a line in the groove. As soon as the line touches both sides, the average value between two points will be taken as the groove center.



Principle of the "Fit Line" algorithm

Many improvements have been performed on the slope detection, removal of bad points that disturb the fit of the slope line. It was done with the help of statistics about the groove width, groove height or slope tilt.

Test procedure

To validate the changes on the program, a test procedure has been written. It produces files that draw functions where bad points were detected and corrected or gives information about the number of corrections.

Achieved work

Prism 2010 is now more stable and produces audio files with a better sound quality, through more robust algorithms. The improvement applies particularly to discs in bad condition.

Processing result of the same data file, before and after the project

