

PRODUCTION

5.1 to 2.0 Audio Downmix Algorithm

Automatic stereo downmix of 5.1 multichannel audio productions

IRT developed a new downmix algorithm which is based on comprehensive investigations on quality aspects in downmixing a 5.1 to a 2.0 format. With this new algorithm it is possible to prevent or to compensate to a high extent the effects which usually lead to impairments of the acoustic stereo-downmix quality.

When developing the algorithm the following requirements were of immediate importance:

- The downmix shall secure the compatibility of multichannel to dual channel stereophony
- Avoidance of typical changes in timbre through comb filter effects
- Generation of a dual channel stereo version which reproduces a meaningful image of the multichannel audio
- The result shall give the listener the impression of a sound as similar to the original as possible
- The downmix shall preserve the spatiality of the original as far as possible with 2.0

Particularly, because more and more radio and television productions are performed with 5.1 multichannel audio the compatibility of such productions to 2.0 stereo, which will remain also in the future the most important format for the majority of the audience, as well as an automatic stereo downmix of 5.1 multichannel become ever more important.

Normally, automatic matrix techniques cause problems: timbre, spatiality, loudness balance and image may change, and with it negatively affect the technical quality and the creative aspects of the production. The algorithm developed by IRT avoids with exception of artistic aspects such problem areas as far as possible, and can be implemented with little effort and at low costs.

Key features

- Active downmix technique with steady signal analysis and there from obtained parameters which allow adaptation of the micro structure of the resulting downmix to an optimal signal structure
- Achievement of a downmix quality which is equal, or in critical cases even superior to that of a manual downmix
- Greatest possible preservation of timbre, ambience, loudness balance, imaging, transparency, artistic content
- Compensation of the comb filter effects at all summation points
- Compensation of too strong accentuation of coherent signal portions
- Correction of the image in the front area
- Parameters for attenuating the surround channels and the centre are variable, and may be adjusted in accordance with the genre and the special requirements on the downmix

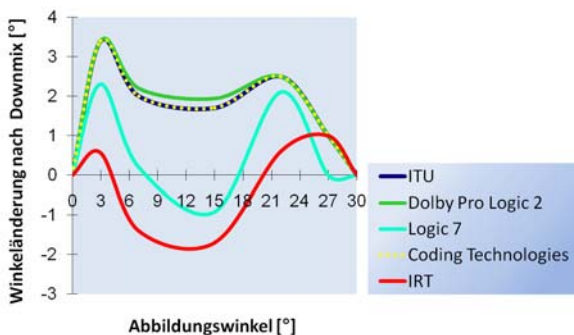


Fig.1: Image stability of phantom sources caused by differences in sound level

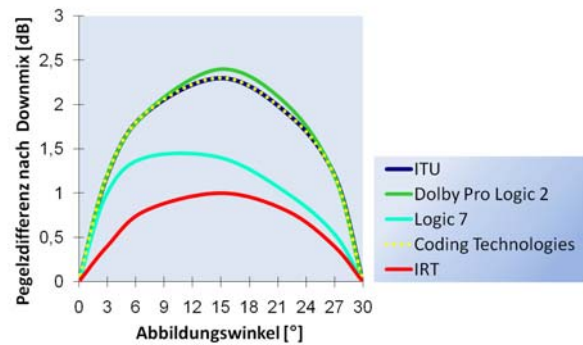


Fig.2: Level change after downmix depending on deflection angle



Fig.3: GUI of the downmix tool with control buttons for attenuating the surround channels and the centre

Implementation

- Algorithm implemented in Matlab and C library; easy to port and, thus, simply to use in different software projects
- VST-plugin with which the downmix can be integrated into VST-capable software (VST-specification 2.4)

System requirements

- OS (PC): Windows[®] 2000, XP, Vista, 7
- CPU (PC): x86-based, ≥ 1.6 GHz
- RAM (PC): ≥ 512 MB