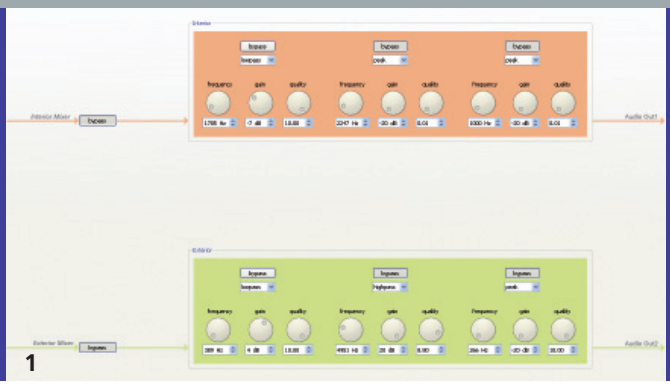
Fraunhofer

FRAUNHOFER SYSTEM RESEARCH FOR ELECTROMOBILITY



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1 *Separated post-processing of audio signals for the car's interior and exterior using the integrated equalizer and filter algorithms.*

DYNAMIC SOUND DESIGN TOOL

No exhaust emissions, no traffic noise – the trend towards driving electric cars is gaining more and more momentum. But what seems to be the perfect solution for future traffic and transportation, entails certain difficulties and insecurities. For pedestrians and cyclists, electric cars are potentially dangerous, as they can be difficult to hear. For the drivers of electric cars themselves, the fact that the car does not give any acoustic feedback impairs their feeling and sensation in the car. Using synthetically produced sounds for both the interior and exterior of the car, potential risks to other road users can be minimized, while the driving experience for the driver themselves can be made more comfortable.

Dynamic Sound Design is a tool developed by Fraunhofer IDMT which createsfor the creation of sound scenes to assist the driver in any situation. The array of sounds match the different dynamics and characteristics of driving, as they automatically adapt to any given situation. In addition, Dynamic Sound Design allows the creation of brand specific sounds, which can be adapted accordingly.

Multiple degrees of freedom for maximum creativity

Dynamic Sound Design is an integrated tool for developing synthetic sounds by means of wavetable synthesis. The tool uses current car and traffic data and translates it into complex sound scenes, both for the interior and exterior of the car. An intuitive user interface allows sound designers to take advantage of different signal processing methods. From pre-processing the car's CAN bus data to compiling different basic sounds to post-processing sounds using the integrated mixer and equalizer, sound designers benefit from multiple degrees of freedom in order to exploit their maximum creative potential. For basic sound design, the tool simply needs to be installed on a common personal computer.

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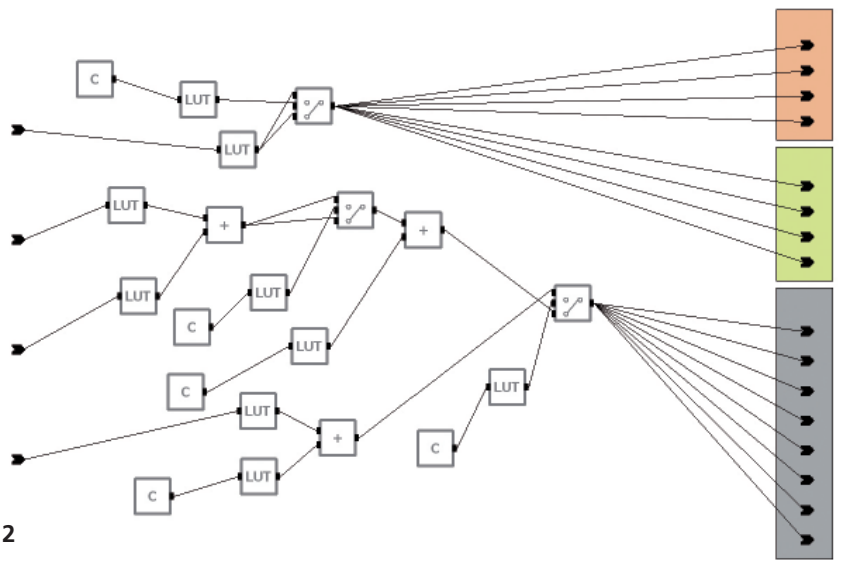
DYNAMIC SOUND DESIGN TOOL



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Online monitoring

As the transition from the design phase to the test phase may take very long, the critical factor here is the length of the iteration between creating a sound scene and testing it in the car; the more effective this transition is designed, the better the quality of the result. Besides a design component, Dynamic Sound Design also has a component for sound synthesis, which produces the predefined sounds while driving. A quick upload of project data to the car is the first step towards more efficiency. In this respect, online monitoring is a special feature to be used by the sound designer after the upload of data; it allows the designer the ability to fine-tune the sound by setting parameters afterwards, or to load different presets directly into the car (i.e. making a desktop computer unnecessary). If changes via fine-tuning should prove impossible, the sound designer may use the online monitoring feature to record interim values of the different signal processing stages, which can later be conveniently evaluated on the desktop.

Sound branding and customization

As Dynamic Sound Design allows the creation of complex sound scenes in a relatively short amount of time, both car manufacturers and drivers may desire to have their own, individual sound designed. Dynamic Sound Design therefore offers sound designers the opportunity to do sound branding and subsequent theming at the customer's request. While customization and personalization of sounds are definitely an important aspect for drivers, it can also function as a significant USP for car manufacturers.

Features

- online monitoring
- intuitive graphic user interface
- data can easily be uploaded to the car
- customized/personalized "sound themes" for drivers and car manufacturers

Technical information

Controller

- CAN bus interface with the car
- predefined "primitive blocks" for intuitive visual processing of the car's CAN signals for synthesizer control
- CAN signal simulation by means of "primitive blocks" in the controller module

Synthesizer

- 8 parallel synthesizers can be configured
- 2 mixers, each for 4 synthesizer signals (interior/exterior)
- edit, save, and reload existing synthesizer configurations
- wavetable synthesis

Availability

Dynamic Sound Design is a demonstrator tool which can be used by car manufacturers and adapted to their specific requirements. Individual programing is facilitated by a graphical user interface.

2 *Pre-processing of the car's CAN bus data using sound parameters of the integrated synthesizer and mixer.*

version 8/2015 photo acknowledgment: Fraunhofer IDMT