

VRVis Center

VRVis – Visualization, Rendering and Visual Analysis Research Center
Programme: COMET – Competence Centers for Excellent Technologies

Programme line: K1-Centres

COMET subproject, duration and type of project:

CSI – Complex System Investigation, 01/2014 – 12/2016, multi-firm

Augmented Reality Sound Simulation

AVL EXCITE Acoustics is a tool for the calculation of sound radiation in free field from vibrating structures such as engines and power units. It efficiently calculates the sound radiation in free field and provides airborne noise results, which are directly comparable with measured acoustic data and legal noise limits. Together with AVL, VRVis has developed an Augmented Reality application, which allows presenting and evaluating the results as three-dimensional object with spatialized sound as overlay over real world live video on a mobile device..



AVL EXCITE ACOUSTICS Efficient Sound Radiation Calculation

Although the evaluation of structure-borne noise (surface velocities) as result of an engine or power unit flexible multi-body dynamic analysis already is a good basis for improving design, excitation mechanisms and transfer paths, the direct evaluation of airborne noise allows assessing and improving the design on basis of real “sound” quantities.

Using previously calculated surface velocities as input EXCITE Acoustics efficiently calculates the sound radiation in free field and provides airborne noise results which are directly comparable with measured acoustic data and legal noise limits.



Mobile Augmented Reality 3D Sonification & Visualization

The result of this simulation is the simulated sound the motor emanates into different directions. Instead of displaying the results as tables or diagrams on a PC, we developed an augmented reality application for a tablet. This App overlays the simulation results as 3D graphic

over the live video stream, augmenting a physical marker in the real world (see figure 1).

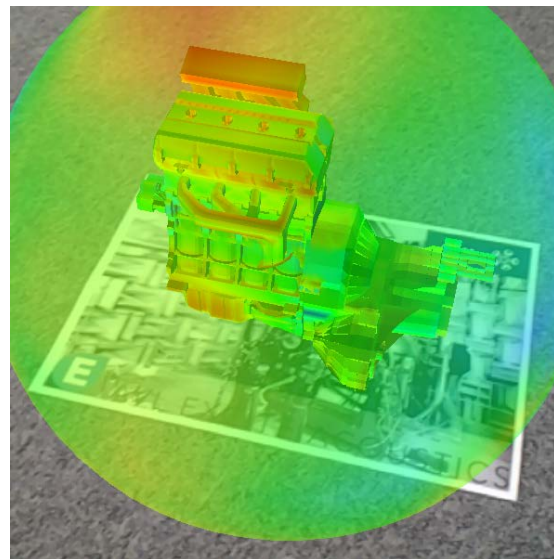


Fig. 1: False color 3D motor visualization on a printed marker. © 2015 VRVis GmbH

The sound amplitude is visualized as false colors on a semi-transparent sphere surrounding the motor model (see figure 2), while the vibration is displayed similarly coded on the model itself.

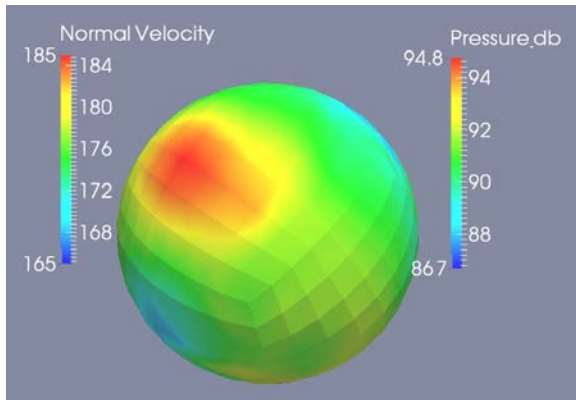


Fig. 2: False color sound emanation over the sphere. © 2015 AVL List GmbH

The sounds themselves are played back according to the viewing direction, generating a visual and auditory simulation of the running motor.

Instead of moving the motor model using keyboard and mouse, the user just naturally moves the tablet around the (virtual) model, hearing the sounds the motor would produce for a given viewpoint while seeing the model from the correct perspective.

The tablet can even be moved inside the motor, making inspecting the internal structure easy.

Impact and effects

The Supplier Day 2015 with over 150 European AVL Top Suppliers proved again to be a successful event. The EXCITE App proved to be an extremely useful and popular method to disseminate the results of the sound simulation.

At the AVL Sales Conference in January 2016 the App – with additional new data sets – again proved a success and crowd favourite, being presented to over 1000 visitors.

During 2016, the App will be further expanded to include an extended user interface and user downloadable content. This will tightly integrate mobile augmented reality in AVL's workflow and enhance customer



Fig. 3: Demonstrating the App at the AVL Suppliers day © 2015 AVL List GmbH



Contact and information

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Further information on COMET – Competence Centers for Excellent Technologies: www.ffg.at/comet

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