

LISTEN

AURALIZATION OF URBAN SOUNDSCAPES

The LISTEN Demonstrator is a tool for simulating (auralizing) noise-polluted urban soundscapes. The main objective for LISTEN is to develop a user-motivated 3D-software demonstrator of urban soundscapes, by which architectural and noise-control solutions for improving urban soundscapes can be auralized at the planning stage. Various solutions for soundscape improvement may thus be evaluated by simply listening to their effect on the perceived soundscape.

The project is motivated by the strong need for perceptual evaluation, already at the planning stage, of architectural and noise control methods for improving noise polluted urban soundscapes. Future applications of the demonstrator will make significant impacts on city and urban planning, since it is intended for architects, acoustic consultants, city planners, and decision makers, as well as for the public.

The Demonstrator will illustrate the potential and feasibility of soundscape auralization, by demonstrating the application for three scenarios in a typical urban environment: (1) Outdoor soundscapes at traffic noise exposed side of apartment building, (2) Indoor soundscapes in apartment room exposed to traffic noise, (3) Outdoor soundscapes at shielded side ('quiet side') of apartment building. All scenarios will include the perceptual effects of noise barriers of various materials and geometries [see fig.].

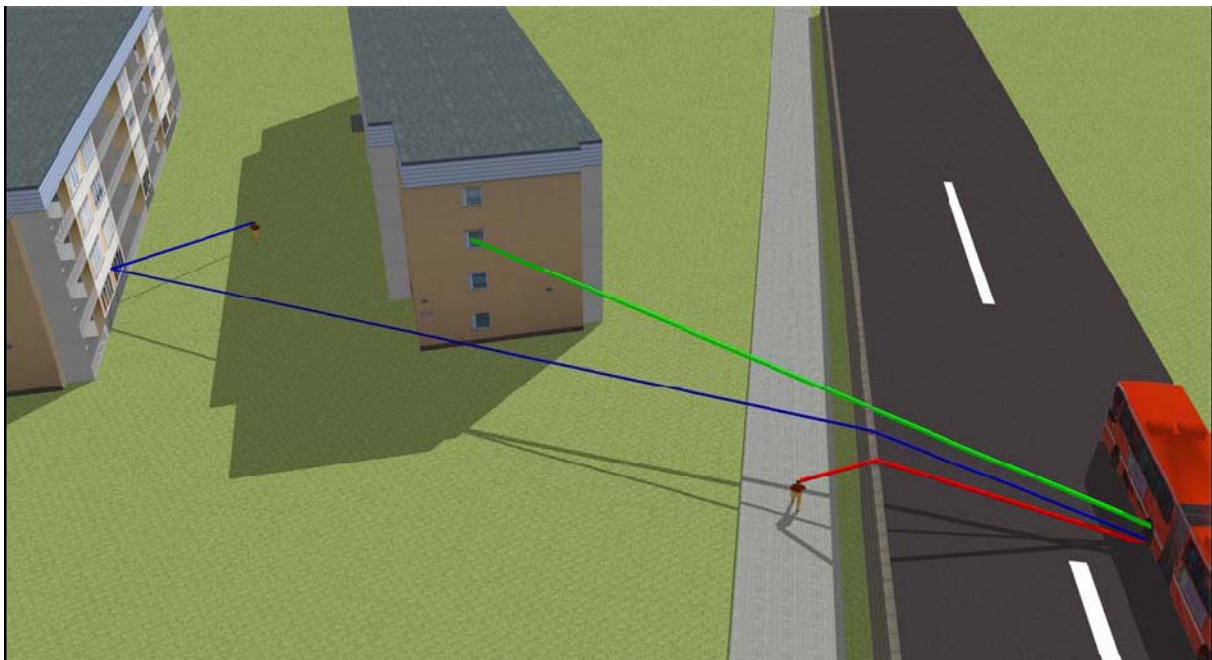


Fig. Schematic illustration of three scenarios: (1) Outdoors behind barrier at traffic noise exposed side of building (red), (2) Indoors in exposed building (green), (3) Outdoors at "quiet side" of building (blue).

The work is divided between four work packages (WPs). A User-driven specification of demonstrator purpose and design (WP0) will determine the direction of research work on Auralization (WP1), Perceptual optimization (WP2) and Acoustic modelling (WP3). Research work of WP1 is cutting-edge software development and auralization, based on an existing platform (Uni-Verse) developed by the work package leader (Interactive Institute). Perceptual optimization of auralizations will be accomplished through psychoacoustic listening experiments (WP2). This research will lead to new knowledge on psychophysical relationships between complex acoustic variables and soundscape perception. WP3 will develop new methods for acoustic modeling of noise propagation, necessary for soundscape auralizations of traffic noise in urban environments.

Research Team & End-User Partners

Together, the research team has unique knowledge and competence for attacking the complex problem of creating a perceptually valid and technically feasible auralization tool for noise-polluted outdoor and indoor environments. This requires knowledge on acoustic modelling of traffic noise, auralization and soft-ware implementation, and auditory perception, psychoacoustic methodology and acoustic design. The following partners are engaged in the research project:

- Interactive Institute, Peter Becker – auralization;
- KTH, Marcus Wallenberg Lab – Andrew Peplow – acoustic modelling of sound propagation;
- Chalmers, Div. of Applied Acoustics – Jens Forssén – acoustic modeling of sound propagation;
- Stockholm University, Gösta Ekman Lab – Mats Nilsson – psychoacoustic perception;
- Konstfack, University College of Arts, Crafts and Design – Björn Hellström – acoustic design.

End-user partners 1-3 are commercial partners in acoustics and noise control, all with extensive experience of measuring and mitigating community noise, as well as, auralization. End-user partners 4-6 are public partners responsible for national or regional noise control, soundscape improvement and city planning:

1. ÅF-Ingemansson, Stockholm, Leif Åkerlöf & Bengt Johansson;
2. RB. Rambøll, Danmark, Allan Jensen;
3. WSP, Göteborg, Klas Hagberg;
4. Vägverket, Kjell Strömmer;
5. Banverket, Kerstin Blidberg;
6. City of Stockholm, Magnus Lindqvist.

Close cooperation between research and end-user partners throughout the project will lead to a demonstrator satisfying both customer and service needs. Quality in the demonstrator will be further guaranteed by leading experts in an International Reference Group.

Public Dissemination Events

A running invited open workshop on case studies, methodologies and technology platforms will be arranged. Responsible for this activity is partner Interactive Institute (II) as part of work within WP0, in cooperation with all other partners. Dissemination at SVIB, Scandinavian Physical Acoustics symposia and European noise conferences will be arranged by Chalmers and KTH; and all partners involved will arrange seminar sessions at major European and International conferences (ASA-Euronoise 2008, Inter-Noise 2009-2010; ICA 2009) as well as Public Health and Architecture conferences. Exhibition stands to demonstrate the product will be arranged for congresses. Commercial exhibition stands may be shared with ÅF-Ingemansson, Rambøll and WSP. The LISTEN demonstrator will be jointly developed, led by II with its background in innovative ICTdemonstrators. Development will be done with input from all research partners and end-user partners. An outline of a Business Model for the LISTEN demonstrator will be produced by the partners, headed by II.