NTNU

Acoustics Research Centre

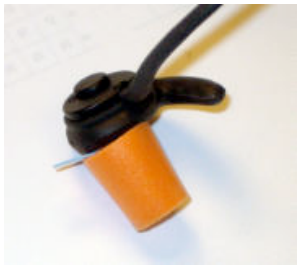
Department of Electronics and Telecommunications (IET)
Faculty of Information Technology, Mathematics and Electrical Engineering (IME)
Norwegian University of Science and Technology (NTNU)

Environmental Acoustics

Arild Brekke, Odd Kr. Ø. Pettersen

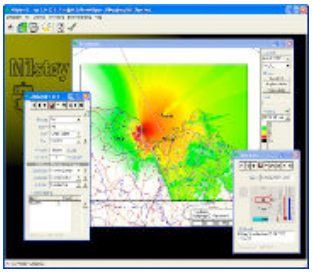
This area covers all types of sound as positive or negative factors in our environment. Primarily, our research activities deal with measurement techniques both in buildings and the outdoor environment, propagation models for indoor and outdoor sound propagation, and the perception of complex noise environments.
The area involves theory and practical methods for the design of rooms, halls and areas where sound and vibration have some impact on people, i.e., noise, vibrations, room acoustics, and building acoustics. Furthermore, this includes both objective and subjective criteria for the influence of noise on humans and animals. We have a focused attention on noise in urban environments as a very important environmental factor. In connection with industrial activities, noise is often a larger problem than air pollution. The reduction of noise in the working environment, and the development of new and improved methods and technology for occupational noise reduction are major aspects of our work. This includes the study of acoustic absorbers and silencers, instrumentation for noise monitoring, and prediction models of the effect of noise reduction measures.

Applications of Environmental Acoustics



Intelligent active ear plug

Noise exposure measurements at oil & gas installations



Environmental noise prediction

Measurement of aircraft noise

COURSES

Technical Acoustics - TTT4180

The course covers vibrations of mechanical systems as well as the generation, propagation and behavior of acoustic waves in different environments. Reflection and transmission of sound between different media, sound in waveguides and cavities, environmental acoustics, and architectural acoustics are important topics. Examples will be taken from common technical systems as well as musical instruments. The methods of analysis are mostly analytical, but an introduction will be given to numerical methods in acoustics.

Acoustics, Specialization - TTT4700

Includes a project as well as two smaller course modules. Elective modules include Effects of sound, Numerical acoustics, Sound insulation, Noise and vinrations and others.

Elective module – Effects of sound

The course addresses the basic aspects of sound generation, propagation and human exposure. It provides an overview of the evaluation, prevention and control of exposure to noise at the workplace, with special emphasis on the prevention of noise-induced hearing loss. Measurement methods and instrumentation are described together with evaluation criteria, exposure limits and legislation. The hearing mechanism and the consequences of high noise exposure are discussed

Elective modules – Sound insulation/Building and room acoustics

These courses deal with sound insulation and noise issues in buildings. Measurement quantities and techniques are introduced. The properties of various wall and floor constructions are discussed.

Room acoustics – TT8302

Gives the theoretical foundation for sound fields in rooms and how they are perceived by a listener. The course includes methods for calculating sound fields in rooms as well the psychoacoustic foundations for room acoustical requirements. Methods include wave theoretical methods, statistical methods, geometrical acoustics methods and computational implementations. Acoustical measurement techniques, sound absorption, and psychoacoustic criteria for evaluation of room acoustic quality are covered as well.

Nordic courses on acoustics

The acoustics program cooperate with the International MSc programs on Sound and Vibration at Chalmers, Gothenburg and KTH, Stockholm. You can find a wide range of acoustics courses either for remote studies or by spending a semester abroad.

RESEARCH PROGRAM

Environmental acoustics – NFR program

This research program will provide knowledge to assist the authorities in reaching the target of 25 percent decrease in noise annoyance within 2010, and to strengthen the Norwegian noise research community.

These main objectives will be reached by:

Develop tools and methods for measuring and predicting noise annoyance.

Studies aimed at understanding physiological, sociological, and psychological factors influencing noise annoyance.

Designing and developing noise abatement strategies, and models for cost-benefit analysis of noise reduction measures.

Providing know-how and competence on all levels

.

Silence EU program

SILENCE is a research project that integrates the much needed noise-related R&D activities from the road and the rail sector. It will contribute
To enabling a significant reduction of people's exposure to noise,
To developing relevant and world-leading technologies for efficient control of surface transport noise,
To providing innovative strategies for action plans against road transport noise and practical means for their realisation.

ARC – Acoustics Research Centre

Acoustic Research Center is a research program funded by NFR. The aim of the program is to strengthen the basic and applied research within the fields of communications acoustics and marine acoustics where the link to industrial applications is strong. The following research topics are selected:

Numerical analysis and control of sound fields

Acoustic user interfaces in communication and information systems

Digital hearing aids

Acoustic measurement of fish and plankton

Acoustic remote sensing of the ocean environment