SUSTAINING INSTITUTIONS AND COMPANIES DIRECTORY OF POLISH ACOUSTICAL SOCIETY

ADAM MICKIEWICZ UNIVERSITY
INSTITUTE OF ACOUSTICS

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Activity: The Institute of Acoustics of Adam Mickiewicz University is the only university institution of this kind in Poland. It started its scientific activity in 1947 as the acoustic group established within the Department of Experimental Physics. The research problems studied were related to psychological and physiological acoustics, physical and mathematical acoustics, acoustic field and nonlinear vibrations, room acoustics, the problem of noise, and molecular phenomena in the field of ultrasonic waves. An increase of the scientific reputation, the number of staff members and graduate students made it possible to set up the Institute of Acoustics in 1986.

Institute of Acoustics consists of 4 divisions with the research topics mentioned.

ELECTROACOUSTICS headed by Professor Edward Hojan

Current activity: the determination of objective characteristics of transducers and their correlation with subjective assessment, computer aided methods of sound radiated by loudspeaker into a room, fitting of hearing aids, modal analysis, interferometric holography and laser speckle pattern interferometry.

ENVIRONMENTAL ACOUSTICS headed by Professor Rufin Makarewicz

Current activity: perception of time-variable sounds, environmental approach to noise annoyance, theoretical description of environmental noise sources, models of propagation of traffic, railway and aircraft noise, noise barriers, application of theoretical models in software for noise perception

MOLECULAR ACOUSTICS headed by Professor Andrzej Skumiel.

Current activity: propagation of ultrasonic wave in an external electric and magnetic fields, absorption and dispersion of ultrasonic wave in a critical mixture, vibration-, structural-, and chemical relaxation.

PSYCHOACOUSTICS and ROOM ACOUSTICS headed by Professor Edward Ozimek

Current activity: perception of irregular changes of amplitude and frequency of a sound, binaural detection and discrimination of AM and FM signals, changes of sound instantaneous frequency in a room, non-linear properties of the auditory system, objective methods of hearing impairment evaluation, otoacoustic emissions and its use in the modern diagnostic methods, modelling of the hearing impairments by means of AIM package, speech intelligibility of hearing impaired persons.

The spectacular development of the number of students took place in 1992 when the School on Hearing Aids was founded at the Institute. It is the only such school in Poland. 25 students are admitted to the program each year . After 3 years students are qualified to work as licensed hearing aid acousticians and may then also be qualified to continue study at the graduate level within the Institute of Acoustics. The second time the number of students dramatically increased in 2000. At that time the School on Sound Design was founded at the Institute.

BUILDING RESEARCH INSTITUTE, ITB
ACOUSTICS DEPARTMENT

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Activity: Building Research Institute,Acoustics Department was established in 1958-1960 as a result of demand for the scientific research works in the field of building acoustics(1948) and room acoustics (1952). Since 1962 Acoustics Department has been managed by Prof. Jerzy Sadowski. In 1962 Department was equipped with the modern Acoustic Laboratory for the needs of building acoustics and room research. The Laboratory was enlarged and modernised in 2000.Today it is the modern and best equipped Acoustic Laboratory .Measurements methods and procedures comply with standard requirements of EC and ISO. In Acoustic Department there has also been created a new branch of the acoustics - URBAN ACOUSTICS.(First acoustic maps of Warsaw, Gdansk, Poznan, Bydgoszcz and other towns in Poland (1970-1980). First acoustic map of Poland (1980), ITB Instruction N0 310 Methods of preparing of the acoustic plans of towns and areas (1992),computer software (HPZ 2001, Data Base 2000 and many other works useful for the environmental protection against noise and vibration has been elaborated. In recent years ,activities of AD BRI have focused on research concerning:- Architectural acoustics, involving urban acoustics, building acoustics, room acoustics, installation and industrial acoustics;

- environmental protection against noise and vibrations,
- assessment criteria,
- bases of forming the proper acoustic climate in civil engineering works and their surroundings Acoustic Laboratory Acoustic Department BRI carries out: Laboratory tests of the acoustic properties of products and building elements;
- field tests of acoustic conditions in the building, work places and outdoor environment;

On the basis of research works the Acoustics Department develops:

- methods and criteria for assessment of products,
- methods of design of building structures as well as building and urban solution with regard of acoustic (e.g. barriers)
- methods and criteria for noise assessment including environmental noise from various sources,
- methods for creating the acoustic maps of towns , regions and country,
- scientific basis for elaboration of legal documents (acts, decrees, standard , drafts) in the range of protection against noise and vibrations, in co-operation with CEN TC 126, ISO TC 43/SC 2 and Polish Standard Organisation (PKN)

CENTRAL INSTITUTE FOR LABOUR PROTECTION, DEPARTMENT OF NOISE AND ELECTROMAGNETIC HAZARDS

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Activity: The Principal activities of Department:

- evaluation of occupational risk related to exposure to noise and vibration
- evaluation of noise emission of machinery and devices
- development of noise reduction methods and guidelines
- development of modern noise reduction system, including active systems
- testing and conformity assessment of hearing protectors
- computer-aided selection of appropriate hearing protectors for given noise parameters
- development of auditory danger signals
- testing and assessment of sound insulation performance of industrial cabins
- testing and assessment of attenuation and vibration-insulating properties of materials protecting against vibration

- testing and assessment of the properties of anti-vibration gloves and selecting appropriate ones for given models of vibrating tools.

CHOPIN ACADEMY OF MUSIC, AMFC
MUSIC ACOUSTICS LABORATORY

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Activity: Current research projects:

1. Perception of pitch
- Psychological scale of pitch value obtained by absolute magnitude estimation vs scales of pitch distance
- Pitch perception of low-frequency sounds
- Measurements of pitch strength with the use of direct and indirect methods
- Absolute vs relative pitch competence in musical tasks

2. Perception of timbre
- Physiological bases of sensory dissonance
- Short-term memory for timbre
- Individual differences in sensitivity to timbre

3. Sound quality assessment:
- Musical instruments
- Sound reproducing systems
- Concert halls
- Musical practice rooms

4. Hearing damage from exposure to loud musical sounds
- "Music noise" and ototoxic drugs as a source of hearing damage in children
- "Music noise" as leading to distruction of the high-frequency perception in the hearing system of musicians
- Cochlear pathology and CNS-degenration resulting from "specific music noise"

GDANSK UNIVERSITY OF TECHNOLOGY
DEPARTMENT OF MARINE ELECTRONIC SYSTEMS

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Activity: The Department of Marine Electronic Systems is the part of the Faculty of Electronics, Telecommunications and Computer Science inside of the Gdansk University of Technology. Postgraduate and undergraduate courses delivered by Acoustics Department include Theoretical Acoustics, Underwater Systems, Electro-acoustics, Navigation Systems and Ultrasonics. Research topics cover the main areas of underwater acoustics, especially analysis and design of underwater systems, digital signal processing in sonar systems, acoustic wave propagation and modelling in shallow and inland water. The Department of Marine Electronic Systems is also engaged in R&D process, in particular in various sonar system design for military and environmental application.

GDANSK UNIVERSITY OF TECHNOLOGY
DEPARTMENT OF GEOINFORMATICS

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Activity: Department of Geoinformatics is a part of Faculty of Electronics, Telecommunications and Informatics of the Gdansk University of Technology.
Research carried out in the department focuses on processing and analysis and visualization of information related to marine and land environment. In particular, the research activities include: Web-based interactive Geographical Information Systems GIS, 3D imaging of underwater objects using Virtual Reality Modelling Language (VRML), intelligent methods of recognition and mapping of seafloor, acoustic monitoring and population assessment of marine living resources. Courses offered for students on undergraduate and postgraduate levels include GIS and Electronic Navigation Chart Systems, remote sensing systems, Internet programming, microprocessor and embedded systems. Some results of this research have been successfully implemented in the real time seabed classifiers, portable dynamic GIS and mapping systems and in the miniaturised microcontroller driven digital echosounders.

GDANSK UNIVERSITY OF TECHNOLOGY
MULTIMEDIA SYSTEMS DEPARTMENT

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Activity: Multimedia Systems Department is a part of the Faculty of Electronics, Telecommunications and Informatics of the Gdansk University of Technology. The Department cultivates multimedia technology, especially sound and visionengineering. Coursework and research embrace diverse areas of DSP, softcomputing, microprocessor systems design, telecommunication applications,speech processing and recognition, musical acoustics, sound synthesis,psychoacoustics, hearing & speech aids, telemedicine & telecare applications, studio technology and sound reinforcement. The application areas include hearing, speech & vision, multimedia transmission, room acoustics and sound reinforcement technology, design, construction and programming of audio-video systems and devices, DSP programming, signal restoration and sound & image pattern recognition, noise monitoring. For more information see: http://www.multimed.org .

INSTITUTE OF FUNDAMENTAL TECHNOLOGICAL RESEARCH
POLISH ACADEMY OF SCIENCES, IPPT PAN

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Activity: Current research activities of **Department of Physical Acoustics** of Institute of Fundamental Technological Research:

- Relations between the parameters of structures and the elasticity constants of ceramic and composite materials investigated by ultrasonic measurements.
- Application of acoustic emission for phase transitions and sol-gel processes monitoring.
- Investigation the effects of pseudoplasticity of ceramic materials by acoustic emission method.
- Structure investigations of liquids, polymer and supramolecular solutions by applications of shear and longitudinal ultrasonic waves.
- Ultrasonic measurements of viscosity of liquids systems (homogeneous liquids, emulsions, suspensions and other multiphase systems).
- Investigation of the physico-chemical properties of Langmuir-Blodgett films and their application for the surface acoustic wave (SAW) sensors.
- Acoustic surface waves (Love, Bluestein-Gulyaev) and bulk shear waves for viscosity measurements of resins.
- Acoustic emission in PZT ceramics generated by electric fields of high amplitude and low frequency.
- Acoustical sensors for detection and concentration measurements of chemical compounds.
- Adaptation of acoustic methods for estimation of ceramics technology, chemical processes and pollution of environment. Investigation of textural properties of crunchy food products using acoustic emission method.
- Analysing of wear processes in bearings and tribological pairs using acoustic emission method.

Current research activities of **Ultrasonics Department** of Institute of Fundamental Technological Research:

- Theoretical and numerical investigations of the nonlinear acoustics fields in biomedical applications.
- Method of modelling and designing wideband circular transducers with long focal zone resolution.
- Non-invasive, ultrasonic measurement of hematocrit.
- Non-invasive, ultrasonic examination of the arterial wall elastocity and the vascular input impedance.
- Analysis of blood pressure wave in the human arteries on the basis of non-invasive ultrasonic examinations.
- Scanning Acoustic Microscopy development for imaging of the surface and interior of biological materials and solids.
- In vivo assessment of a trabecular bone status by processing transmitted and backscattered ultrasonic waves.

NAVAL UNIVERSITY OF GDYNIA
DEPARTMENT OF RADIOLOCATION AND HYDROACOUSTICS

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Activity: Department of Hydoacoustics, established in 1985, continues the works which had been started by the Acoustics Laboratory at the Research Center of the Navy in early sixties. The majority of the projects use information included in underwater noise. Therefore a lot of attention is devoted to perfecting the measurements methods, the analysis of underwater noise produced by ships and the conditions of acoustic wave propagation in the sea. Seasonal changes of wave propagation in the South Baltic were studied. Also a theoretical model of

selected phenomena was developed. One of the major works carried out by the Department of Hydroacoustics was the construction of a coastal range, which is used for regular measurements of ships' underwater noise and to assess the correctness of their acoustic characteristics.
The other field of investigation is nonlinear acoustics, developed since 1985. Experimental and numerical studies have been made on the interaction of high intensity waves in water and seawater, on the effects of the changes of hydological parmeters of seawater on changes of its nonlinear features, and on the pressure field evolution in the vicinity of high intensity underwater sources of different shape and aperture.
Current activity of the Department covers the following fields: method of localisation of the underwater source basing on measurements of intensity of sound, physical mechanisms of underwater sound generation by ship, specific features of the Baltic Sea for sound wave propagation and its impact on range of underwater devices, pressure field of finite amplitude sources composed in form of multielement array.

RZESZOW UNIVERSITY OF TECHNOLOGY
FACULTY OF CIVIL AND ENVIRONMENTAL ENGINEERING

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Activity: Scientific problems dealt with cover physical acoustics, noise and vibration protection, and mathematical methods in acoustics.
The most recent scientific interests are:
- the interaction of an acoustic high intensity wave field
- dispersions (suspensions, aerosols, emulsions, etc.) - the analysis theoretical,
- analysis of the boundary problems with boundary element method.

SEA FISHERIES INSTITUTE, SFI

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Activity: The Sea Fisheries Institute since 1921 is carrying out marine research in oceans and in particular in the Baltic Sea. The principal areas of research include: fishery biology and oceanography, marine ecology and fish processing techniques. Basic financial support for the institute comes from the state Committee for Scientific Research. Close co-operation (joint Projects and grants) with International Council for the Exploration of the Sea, the International Baltic Fisheries Commission, and FAO is conducted.
Institute provides research necessary to prepare scientific basis for the rational exploitation of living resources (biology, oceanography and molecular genetics).
In 1973 the Institute was accredited to award the Ph.D. degree and since 1997 to award Doctor of Science degree.
The SFI has at disposal the R.V. Baltica, 41m length stern trawler equipped with a wide range of scientific equipment (including EY500 echo-sounding system, ASDP and trawl sonar).
Operational area of Sea Fisheries Institute in the field of acoustics:
- application of acoustics for studying the fish-environment interactions and modelling,

- studies of dynamics of fish and environmental factors distributions in the southern Baltic,
- acoustic identification of sea bottom

SILESIAN UNIVERSITY OF TECHNOLOGY
INSTITUTE OF PHYSICS
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Activity: The Institute of Physics is a didactic as well as research units in the organizing structure of the Silesian University of Technology in Upper Silesia Region, in Poland. In the Institute of Physics are engage above sixty scientific workers. The Institute of Physics conducts research in the following acoustic disciplines: solid state acoustics, acoustoelectronics, noise protection, photoacoustics and theoretical acoustics. In the Institute are developed also solid state physics, optoelectronics, microelectronics, photothermics, radioactivity measurements, environmental protection. The Institute of Physics conducts very wide didactic activity in all Faculties of Silesian University of Technology.
From thirty five years the Institute of Physics is co-organizer the annual conferences, so-called Winter School on Wave and Quantum Acoustics (international) and Winter School on Vibroacoustical Hazards Suppression (national). With the international WS on W&QA are connected some Winter Workshops (WW), actually: WW on Photoacoustics and Thermal Wave Methods, WW on Acoustoelectronics and Optoelectronics, WW on Molecular and Quantum Acoustics.

UNIVERSITY OF GDANSK
INSTITUTE OF EXPERIMENTAL PHYSICS
Division of Acoustics and Solid State Physics
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Activity: The studies provided at the Division of Acoustics and Solid State Physics of Institute of Experimental Physics of Gdansk University.
- Acoustic spectroscopy research ie. measurements of velocity and absorption in pure fluids (e.g. organic compounds) and their mixtures (e.g. mixtures of water and non-electrolyte) allows discover many relaxation processes: Kneser relaxation (heterocycle compounds), isomeric rotational relaxation (ketones), structural relaxation, phase transition (liquid crystals) creation of any structures in liquid and gas state (clathrate structure).
- Photoacoustic spectroscopy (PAS), a branch of absorption spectroscopy in which the sample heating caused by selective absorption of optical energy is monitored. PAS one can analyse the light-sample interaction not through detection of photons, but through the energy absorbed by the material and con verted into heat via nonradiative processes. Photothermal methods are more extensively used for investigations of molecular media.
- Photoacoustic spectroscopy gives as direct information on some nonradiative processes in the system under investigation. The analysis of photoacoustic spectra allows to consider the nonradiative processes and the energy migration processes. It allows to estimate the quantum efficiency of the system as well.

- Room acoustics, noise control, acoustic isolation problems.

UNIVERSITY OF MINING AND METALLURGY
Department of Mechanics and Vibroacoustics
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Activity: Department of Mechanics and Vibroacoustics is an educational and research institution belonging to the AGH University of Science and Technology in Krakow.
The Department activity covers the following fields:

- Environmental Acoustics (measurement and control of acoustic pollution, computational methods FEM, SEM, SEA),
- Acoustics Modelling - (SYSNOISE, RAYNOISE, SEASY, PATRANI NASTRAN, ANSYS),
- Structural Acoustics (The identification and the analysis of vibroacoustic processes Investigations for development of energy method's of prediction of transmission paths and radiation of subsystems of complex mechanical systems),
- the applications of Active Methods in the control of vibration and noise, and generation
of strong acoustic fields needed for cleaning the machinery of settled dusts,
- Room Acoustics (acoustic adaptation of rooms and evaluation of room acoustics, new technologies of controlling the sound)
- Acoustics in Siomedical Field (Sources and propagation of low frequency waves in the environment, potentials in brain under low frequency wave field impact, Ski n sensitivity and reactions on low frequency vibrations and waves, Low frequency waves in nature and impacts on humans).
- Sound and audio engineering,
- Applied mechanics theory of machines,
- Computer sciences in mechanical engineering.

UNIVERSITY OF MINING ANO MET ALLURGY
OEPARTMENT OF ROBOTICS ANO MACHINE OYNAMICS
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Activity: The Department Of Robotics And Machine Dynamics is a educational and research institution belonging to the University of Mining and Metallurgy in Krakow. Its activity deals with investigations of acoustic and vibration processes, theoretical and applied mechanics, a complex analysis of dynamic processes in machines, life and reliability of machines and devices, analysis and synthesis of manipulators and robots, problems of selection and designing of robot drives and their control systems.

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Activity: The Faculty of Mathematics and Natural Sciences incorporates three Institutes: Institute of Physics, Institute of Mathematics and Institute of Technology. Two of them: Institute of Physics and Institute of Technology have a growing research program in the areas of acoustics and vibrations.
The problems of physical acoustics, general linear acoustics, structural acoustics, active noise and vibration control and mathematical method in acoustics are dealt with at the Institute of Physics and the Institute of Technology as well.
The most recent scientific interests are:

- theoretical and experimental analysis of the acoustic field generated by some flat sources,
- theoretical and experimental investigations on the active sound and vibration control of plates, including linear and non-linear modeling and/or system identification, optimal, predictive and fuzzy control with the use of smart structures,
- acoustic wave propagation within some waveguides with rigid walls.

WROCLAW UNIVERSITY OF TECHNOLOGV
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Activity: The Institute of Telecommunications and Acoustics (ITA) belongs to Electronic Department of Wroclaw University of Technology (WUT). The Institute is the educational (at university level) and research institution and offers higher education in electronics and telecommunications. In the field of acoustics its activity refers to wide range of theoretical and technical acoustics and it includes: the foundation of ac. and numerical ac., theory and design principies of electroacoustic transducers, ultrasonic technologies, electroacoustic systems, architectural ac., environmental ac., noise and vibration control, speech and hearing ac., crime ac. and speaker recognition.