Professur für Mikrosensorik und -aktorik
TUM School of Computation, Information and Technology
Technische Universität München

Theses and Internships – Electrical Engineering or related fields

Next-generation MEMS microphones for hearing aids

We are looking for students who like to work in an interdisciplinary team and intend to realize their bachelor / master thesis or IP/FP within our group at Professorship of Microsensors and Actuators embedded in the EU project Listen2Future.

Topic

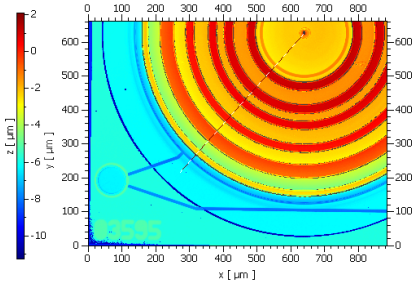
Advances in material science have enabled the use of piezoelectric materials in MEMS microphones. In contrast to commonly used capacitive MEMS microphones, piezoelectric microphones require less energy and are, therefore, useful for mobile applications such as hearing aids. Another advantage of the piezoelectric microphone is the linear relationship between electrical voltage and force. This simplifies force-feedback control of the sensor, opening up the possibility of further improving the sensor performance. The design of the microphone membrane is crucial for this. Therefore, highly accurate models must be set up to simulate microphone behavior.

Within this project, you will have the opportunity to work on a variety of tasks.

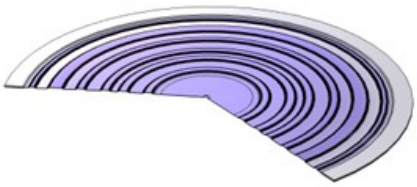
- Modelling of the microphone membrane using FEM tools to simulate its electrical and mechanical behavior. This simulation is performed using COMSOL Multiphysics, the gold standard software for simulating the coupling of different energy domains.
- Optical, electrical, and electroacoustic characterization of novel microphone samples using industry-standard laboratory equipment including a laser Doppler vibrometer, an LCR meter, an acoustic test fixture and an FPGA-based measurement system.
- Modelling of the microphone system using equivalent circuit models, which are suitable for co-simulation with a control circuit.

If you are interested in theses or internships, we can define possible tasks together, depending on your area of focus. We look forward to receiving your application.

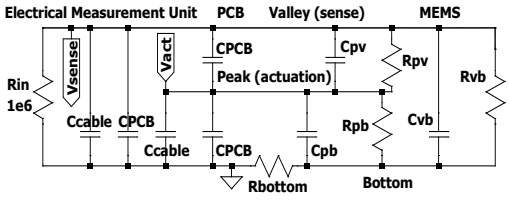
Laser Doppler Vibrometry



FEM-Simulation



Compact Modeling



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Listen2Future

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KDT JU
KEY DIGITAL TECHNOLOGIES JOINT UNDERTAKING

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