



Green Tech
Innovators Club

Hier entstehen grüne
Innovationen

Neue elektronische Sensorsysteme für die Umweltechnik

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TU Graz
Institut für Elektronische Sensorsysteme

TUG-IES



Institute of Electronic Sensor Systems

TUG: 7 Faculties



Electrical and Information Engineering



IES founded 1.3.2016

Head Alexander Bergmann

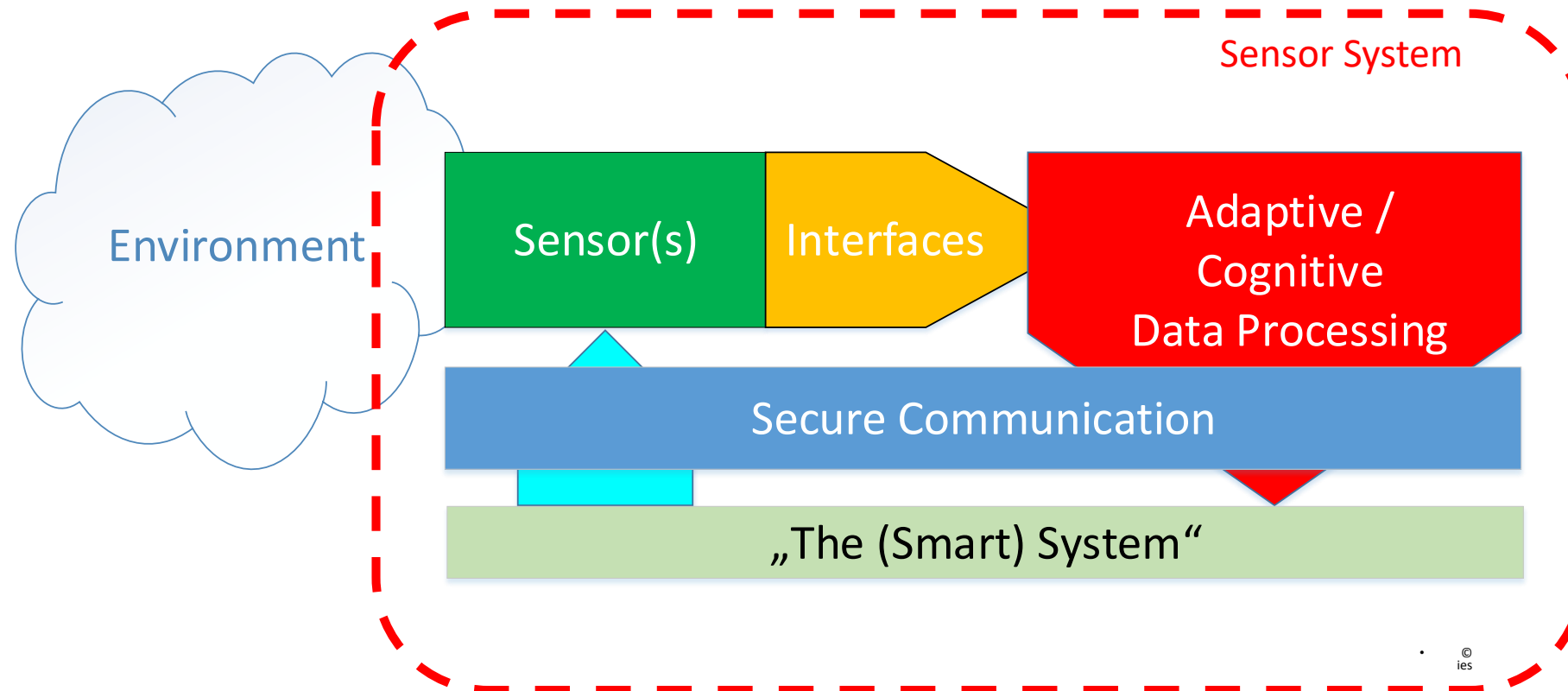
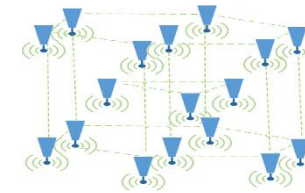
12 employees (10 scientific)

Location at TU Campus Inffeldgasse

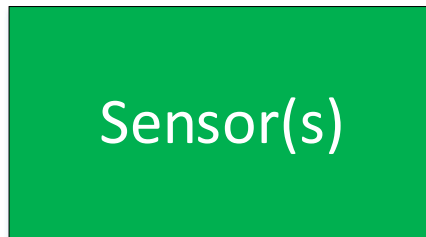
Electrical and Information Engineering, Civil Engineering,
Architecture, Technical Mathematics & Physics,
Technical Chemistry, Computer Science



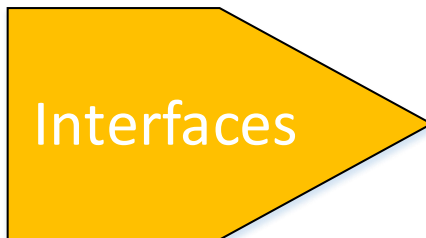
Sensors –a key element of smart systems



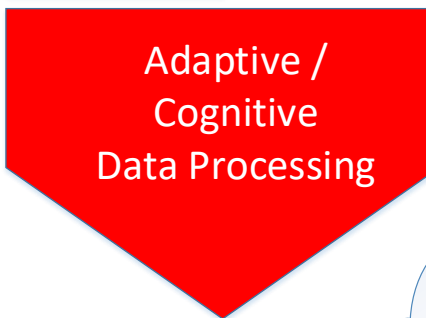
Research fields



- Sensors Physics / Effects (3 PhDs)
- Automotive Sensors (2 PhDs)
- Environmental Sensors (2 PhDs)
- Sensors for Energy Storage (1 Post Doc)



- Sensor Electronics (1 Ass. Prof.)
- Sensor Interfaces



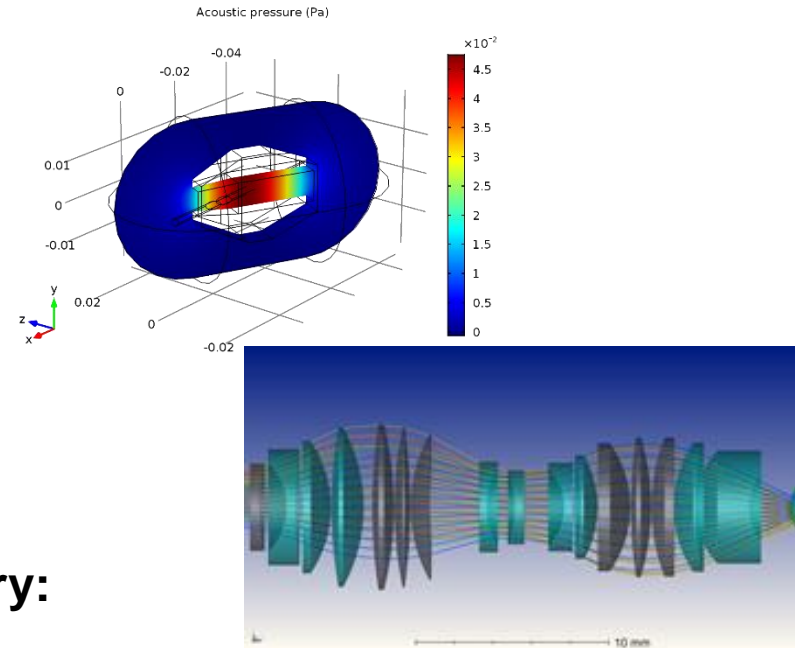
- Sensor Fusion (1PhD)
- Machine Learning (1PhD)



- Aerosol Reference (1PhD)
- Humidity Reference (1PhD)

Infrastruktur

- **Multiphysical simulation:**
 - **FEM:** Comsol (Photonics, Acoustics, MEMS, Microfluidics, Particle Tracing)
 - **Optics Simulation:** Zemax (RayTracing, Comsol Wave Optics)
 - MEMS Design Tools
- **Sensor test und application laboratory:**
 - **Aerosol Reference** lab (Generators: soot, Atomizer, Aerosol Charger; Measurement instruments: Scanning Mobility Particle Sizer, CPCs, Diffusion Charger, Optical Particle Sensors, FTIR spectrometer, LDS, (Micro-)PEMS systems, ...)
 - **Gas Reference** Lab (VOCs, NO_x, NH₃, CO₂, N₂O... Gas Divider 1024 dil. points 0.1% to 100% in 0.1% steps)
 - **Humidity** Generator (0-100% r.H., max. 25m/s)



- **Optics und Acustics laboratory**

- Optical Tables (Newport+Thorlabs) including a variety of mounts and drivers
- Flexible gas und aerosol feeds to the optical and acoustic (anechoic) chambers
- Spectrometers, SPADs, Laser (IR, VIS), Photomultiplier, Si-Photomultiplier, FTIRs (range 1-14 micrometer)
- Mikroskopy (Keyence including fluorescence option)
- Fiberoptical Microphones

Ongoing Research Projects I:

- **DownToTen:** Research on aerosol sensors for emission monitoring down to the nanometer lengthscale funded by EU H2020
- **ParticleSens:** Aims at developing a highly integrated photonic Particle Concentration (PM10, PM 2.5, UFP) Sensor as small as 10 Cent coin, funded by Austrian FFG and AustriaMicroSystems
- **eMission:** Online Monitoring of Particulate Emissions (PN, PM) for roadworthiness testing of LD, HD and NRMM vehicles, funded by Austrian FFG, Ditest and AVL
- **HTSens:** Research on new sensor effects for aerosols for harsh environment applications, funded by the TUG LEAD Porous Materials initiative
- **HRSS:** Development of a High Spatial Resolution Sensor System for Monitoring Air Pollutants in Metropolitan Areas

Ongoing Research Projects II:

- **SoundSense:** Exhaust flow sensing by beamforming ultrasonics, funded by Austrian FFG
- **FCH Diamond:** Modelling and sensing degradation of PEM Fuel Cells funded by Austrian FFG
- **AquaSense:** Research on sensor effects for water concentration and phase (solid, liquid, gaseous) with high time resolution (100Hz), funded by Austrian FFG and AVL
- **VALERIE:** Vibrational Analysis of Lithium Ion Batteries for the determination of the state of health funded by Austrian FFG – MDZ initiative