

Integrated Solutions in Sensorial Structure Engineering



Vision and Aims

ISIS, short for Integrated Solutions in Sensorial Structure Engineering, joins the University of Bremen's competencies in integrating sensors in technical components. From design of components via development of materials and production processes, processing of information and energy supply, all relevant aspects of this topic are covered. ISIS stands for the technology of sensing and will support sensorization in diverse fields of use by providing pioneering technical solutions, identify new areas of application for integrated sensors and develop practical implementation. Furthermore the project aims to advance sensor integration to the level where sensor-equipped structures become sensorial materials and perform fundamental as well as applied research and development to set new standards in safety, efficiency, robustness and reliability of technical products or to enable new capabilities in fields like human-machine interaction.

Smart Sensor Networks

Sensors require data processing capabilities to analyse the signals they record – this requires energy. If this task of deriving information from raw data is to be done at least in part locally, energy must be supplied to each individual sensor node.

The same is necessary if the sensor function itself requires energy, as is the case for strain gauges, which rely on changes in resistance. To measure these, a current needs to pass through the sensor, and thus some power supply is mandatory.

Finer granularity of sensor networks in combination with a desired real-time availability of information leads to a need for new and faster principles of information retrieval, including localised data processing in smart sensor nodes. Higher connectivity in advanced sensor networks motivates further development efforts in the field of wireless communication. Both aspects fuel interest in localised energy supply, including energy harvesting approaches. Success of these approaches depends on intelligently using limited resources in largely autonomous sensor networks. The issue is complicated as information retrieval is connected to energy consumption, a fact which links data processing, organisation of communication and energy management as fields of research.

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