



## Virtual Sensor Hub Prototype based on OVPSim

### *Description:*

The possible applications and distribution of modern MEMS (micro-electromechanical-system) sensor devices increased steadily over the past few years. Among other improvements regarding size and energy consumption, the sensors enable the calculation of sensor data related algorithms directly on the sensor system level, creating sensor hubs. Due to the increasing complexity of those systems, virtual sensor prototypes (VSP) can support their design and implementation more than ever.

In this thesis, an existing processor model from OVPSim shall be extended by basic sensor capabilities using SystemC and TLM2 (transaction layer modeling) interfaces. The sensor hub system should at least consist of a measurement module, a configurable data path and an interface for accessing the measured data. Furthermore, the software running on the OVPSim processor model should be able to process the generated sensor data. The different coupling possibilities between processor model and sensor modules as well as the achieved simulation performance shall be evaluated.

### *The following tasks have to be conducted:*

- Learn about MEMS sensors, SystemC and OVPSim
- Setup OVPSim platform and connect a SystemC top level module
- Design and implement the following sensor related modules on a high level of abstraction:
  - Measurement module
  - Basic resampling filter
  - Register interface for data access and sensor configuration
- Implement software on OVPSim processor which communicates with the sensor hub environment
- Evaluate the coupling between OVPSim and the SystemC sensor hub modules as well as the overall simulation performance of the prototype
- Discuss and document the results and possible limitations

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