

# Internal Memo

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## Description of the Research Unit for Integrated Sensor Systems

The research unit, established in 2004, with its basic idea being to combine in a multidisciplinary way those research fields that are essential for modern integrated sensor systems: Sensor technology, microelectronics, and communication technology. The focus is on structural aspects of the investigated sensor systems, thus the weight of the three complementary fields can vary from case to case. Adequate modelling plays a central role in both the analysis and design of sensor systems, and the methods employed range from the investigation of analytical models to numerical analyses.

The integration aspects the research unit derives its name from can be manifold. They comprise circuitry (with respect to miniaturisation of the sensor or the components relevant for signal processing) as well as functional aspects (mechanisms to increase fault tolerance, but also to combine various sensor principles in order to improve accuracy, measurement range, or robustness) or system-related aspects (in terms of connecting sensors to higher-level systems). The research unit has particular expertise in the areas of micromechanical and miniaturised thermal sensors, optimized system architectures and signal processing for integrated sensors as well as synchronization and security aspects in sensor networks.

Co-operation with external partners is of high significance in the definition and implementation of research projects. The research unit collaborates with research institutes (both university and non-university) and industrial partners alike. Concrete projects comprise problems from automation, medical technology, or test and measurement technology.

## Description of Oregano Systems

Oregano Systems Design and Consulting Ltd. offers both IP-cores and design services for FPGAs and Embedded Systems focused primarily on, but not exclusively on, industrial electronics and telecom applications. Located in Vienna, Austria the company was founded in 2001 as a spin-off from the Vienna University of Technology, where the basic technology for highly accurate and fault tolerant clock synchronization via Ethernet networks has been developed. Aside from mere IP core business the design team of Oregano Systems offers full design support ranging from simple interface adaptations to complete SoC and Embedded Systems design. Currently more than 10 design engineers are teamed up at Oregano Systems with a combined experience in the area of FPGA and ASIC design of more than 100 man-years.

## Current Research Activities

FISS and Oregano Systems are jointly developing new technologies in the area of clock synchronization and related research areas. This includes highly accurate timing in wired as well as wireless networks as a basis for enhanced and reliable localisation services. Further, there is a focus on large-scale system simulation, clock distribution redundancy, and security. As both organisations are members of the IEEE 1588 Standardization Committee, the research results are timely available to the group for discussing new additions to the standard.



## Topics of the Workshop Presentation

- Area of Expertise Research Unit for Integrated Sensor Systems
- Area of Expertise Oregano Systems
- Simulator for heterogeneous networks, accurate network layer modelling, large scale system simulation using discrete event system approach, non-deterministic oscillator model
- Current productive systems (IP cores and network equipment)
- Fault tolerance for IEEE 1588 based networks
- Security integration for clock synchronization
- Synchronization based on standard protocols, components, and networks
- Leading edge accuracy for packet oriented networks

## FISS and Oregano Systems Participants for the Workshop

Georg Gaderer (group leader, clock synchronization), Patrick Loschmidt (group leader, smart systems integration), Nikolaus Kerö (general manager, Oregano Systems)