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Master thesis proposals (2 projects)

Power System-on-Chip for future airborne sensor systems

Size, weight, and power consumption are key parameters to keep as low as possible for high performing airborne sensors. One enabler to achieve this is to increase the level of integration of the electronics. The digital parts of the sensor has long been the driving force in integration, and lately, with the introduction of GaN, the microwave components can now be realized as integrated multi-functional chips. However, the power converters are still bulky components and are a limiting factor in the continued drive to reduce size and weight. With the introduction of GaN also for power switch transistors, it is foreseen that fast switching, small, lightweight, and energy efficient power converters will be possible. The overall aim of the activity is to reduce the size of a power converter to enable a power system-on-chip by increasing the level of integration. This has already been proven in the microwave industry, and a similar future is foreseen for GaN based power electronics.

The project is suitable for two students that work in parallel, preferably one with a background in **electric power engineering**, and one with a background in **microwave electronics**. One part of the work will be design of an on-chip highly efficient buck converter, and another part will be to analyze the electro-magnetic environment on-chip to find suitable solutions for the passive components. Beside the design and EM, an investigation of the optimum switching frequency for a power system-on-chip is needed.

The work will be done in collaboration between Saab AB, Microwave Electronics Laboratory at Chalmers (in-house GaN technology), and Electric Power Engineering group at Chalmers. Furthermore, this work is carried out within the framework of the C3NiT center (http://c3nit.se) on advanced III-Nitride materials for future microwave as well as power electronic components.

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