→ Master Thesis

1.) Design of a Chopper Amplifier (MSc)

High precision operational amplifiers are often required in measurement applications. The limiting factor of such an amplifier is the offset voltage caused by device mismatch. The Chopper Amplifier approach is an advanced technique to cancel this offset without any manually trimming. The topology contains a modulator at the input to create an AC signal that can be amplified with an AC amplifier and a demodulator that converts the AC signal back to DC. Finally a low pass filter is required to attenuate the spikes generated by the modulator and demodulator.

2.) Injection-Locked Frequency Divider (MSc)

One of the most important aspects in integrated circuit designs is power consumption. In order to reduce the power consumption of the divider part in a PLL, the use of an injection locked frequency divider looks promising. After a review of the underlying principles a divider circuit has to be designed suitable for an implementation in a pure CMOS technology.

3.) Design a high performance DAC in a CMOS Technology (MSc)

High-speed and high-resolution digital-to-analog converter (DAC), which enables digital and analog blocks to be integrated on a single chip are a contemporary demand. There is a wide range of possible applications like audio converters in CD players or the interface in communication systems together with a line driver, etc.
In a previous work a 12 bit DAC with an update rate of around 40 MHz was developed on an advanced BiCMOS process. On one chip multiple high speed LVDS input latches with several FIFO's, multiple DAC's and line drivers were combined with a complex data alignment circuit and automatic gain and offset calibration algorithm.
The objective for this thesis is to implement a single DAC circuit from the existing complex system on a new silicon process. The performance like linearity (INL and DNL), settling time, etc. need to be optimized in order to fulfil the requirements on the new process.
Optional the work can be extended to develop an evaluation board together with an evaluation plan that contains proper measurement methods to verify the DAC IP Cell.

Please send your application to:

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IMST

→ Bachelor Thesis

1.) Comparison of GoldenGate and Spectre Simulators (BSc Work)

Wireless communications have emerged as one of the fastest growing segments of the electronics industry. This growth has put tremendous pressures on RF engineers to push into new process technologies, build to tighter specifications and shorter schedules to meet time-to-market demands. New simulation tools are available to solve this problem by promising faster and more precise simulations. IMST uses e.g. the Spectre RF simulation tool as one simulator for designing analogue integrated circuits.
The GoldenGate simulator from Agilent is a new tool. The basic difference to many other simulators is that the algorithm for this tool is based on frequency domain calculations which has advantages especially for simulations of circuits with several frequency components (like frequency divider, mixer, PLLs etc.).
The work includes:

- Comparison of algorithms efficiency between the simulators
- Comparison of simulation time and performance for different circuit topologies
- Comparison of design environment towards operability
- Conclusion: Which simulation tool is useful for what kind of circuit topology and what are the tradeoffs.

About IMST:

IMST is a so called „An-Institute“ of the University of Duisburg-Essen, headed by Professor Wolff and Professor Waldow. Founded 15 years ago, it has since then developed into a comeptence center for the devlopment of high-frequency circuits, radio modules and communication systems. Employing nearly 150 people today, IMST began additionally engagements as a chip design center and in the space sector some years ago.
On one hand side the company serves as a design center for high-end Si-/ SiGe-chip design with a special focus on localization and navigation. On the other hand side, IMST develops and builds special satellite components, including, but not limited to, innovative high-frequency power dividers for the Earth observation satellite TerraSAR-X. As such products are technologically demanding but needed only in small quantities, they form an ideal niche for a small, flexible high-tech enterprise like IMST. IMST products and solution portfolio compromises of electronic steerable antennas for mobile satellite communications as well as tool kits containing key components and subsystems like phase shifters, amplifiers and mixers.

IMST is running a fully accredited Test Center for High Frequency Techniques, Antenna Techniques and Electromagnetic Compatibility.

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