

Master's Thesis / Research Internship

Ultrasound Transceiver Block Design

About us

At the Chair of Circuit Design, we bridge the gap between the physical world and the digital frontier. As society faces global megatrends like climate change and demographic shifts, we believe the solution lies in smarter engineering. We specialize in the development of analog and mixed-mode integrated circuits, creating precise, low-power, and miniaturized sensing systems that power the Internet of Things (IoT).

In this thesis or research internship, you will contribute to our new research topic dealing with wearable ultrasound for continuous blood pressure monitoring.

Motivation

Current ultrasound devices are usually bulky cart-based devices that require a trained operator to perform an examination. By combining low-power integrated electronics with a wearable transducer assembly, one can enable continuous imaging without the need for a trained operator. A promising application is to use such a wearable ultrasound system for cardiovascular monitoring. Ultrasound is currently the only method that allows blood pressure measurements without the need for frequent calibration or variable pressure application. This makes it an attractive candidate for smart wearables and healthcare.

What are good prerequisites for this work?

- Successfully completed relevant courses in analog circuit design
- In-depth understanding of analog circuit design
- Knowledge about analog layout
- Ideally, you already have practical experience in designing analog circuits
- Nice to have: Experience with Cadence Virtuoso, tape-out experience

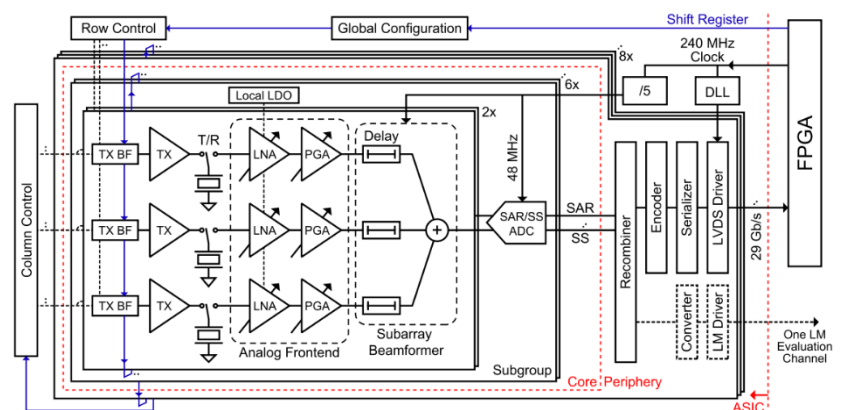
Tasks

Depending on the specific topic, we can offer you, you will:

- Understand the basics of ultrasound and transceiver architectures
- Contribute to discussions about the transceiver architecture
- Support us in designing selected blocks of a low-power wearable ultrasound transceiver
- Support us with layout activities

Contact

Leon Dixius, M. Sc.
Tel. +49 89 289 22930
leon.dixius@tum.de



Example image:

Y. Hopf et al., "A Pitch-Matched High-Frame-Rate Ultrasound Imaging ASIC for Catheter-Based 3-D Probes," IEEE Journal of Solid-State Circuits, Vol. 59, No. 2, p. 476-491, 2024, doi: 10.1109/jssc.2023.3299749