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Design of a Fourth-Order Bandpass Sigma-Delta Modulator.

ABSTRACT - Masterthesis

In this thesis, a fourth-order low-distortion bandpass delta-sigma modulator (4thorder SDM) with switched-capacitor (SC) resonators is proposed. It highly increases sampling frequency to reduce the power density of the quantization noise and offers fourth-order noise-shaping. Therefore, the delta-sigma modulator can be employed for an autonomous sensor node properly, e.g. fire detection. The design is carried out as follows: First, MATLAB and SIMULINK are used to ensure performance of the architecture, like behavioural modelling of signal path and stability of modulator.

Second, circuit design is done with Mentor's custom IC design platform in 0.35 μm CMOS technology. The final implementation of the delta-sigma modulator should work at a bandwidth of 600 kHz, a sampling frequency of 38.4MHz, oversampling ratio of 32 and a dynamic range of 42 dB .