DOKTORAND:	Jørgen Andreas Michaelsen
GRAD:	Philosophiae doctor
FAKULTET:	Det matematisk-naturvitenskapelige fakultet
INSTITUTT:	Institutt for informatikk
FAGOMRÅDE:	Nanoelektronikk
VEILEDERE:	Dag T. Wisland og Tor Sverre Lande
DISPUTASDATO:	23. april 2014

AVHANDLINGENS TITTEL:	*A VCO Linearization System for ADC Applications*

Wireless sensor network (WSN) nodes are growing in popularity in diverse applications, such as monitoring environmental conditions and health care. The autonomous nature of the WSN impose stringent demands on the power consumption. A critical component in any sensor system is the data converter that translates the physical measurements to numbers that can be used for computation and analysis of the sensor data. Frequency delta-sigma modulator (FDSM) based analog to digital converters (ADCs) have salient features that makes this class of data converter suitable for typical WSN applications. This thesis is focused on solutions for systems that are demanding in terms of signal fidelity and robustness without compromising energy efficiency.

Data converters are the crucial link between the digital processing and the outside world, and are used in all electronic systems. The low supply voltage in recent CMOS technologies pose a challenge to conventional analog and mixed signal circuits, as most signals are conveyed in the voltage domain, and a reduction in the available voltage headroom directly impacts the signal to noise ratio (SNR). The power consumption must increase to maintain the performance. This challenge is compounded in autonomous wireless nodes, where the available supply voltage may be low if energy scavenging is used to power the circuits, and the available energy is scarce.

CMOS technology is inherently suited for switching to digital levels, and the timing of events can be used to convey the signal. The time domain accuracy is maintained even if the supply voltage is scaled, presenting opportunities for realizing more technology friendly circuits. FDSM based ADCs map the input voltage to a time domain variable for subsequent processing to a sampled and quantized digital output. This work presents an energy efficient solution at the circuit level for improving the performance of the voltage to frequency mapping in terms of signal fidelity.