ABSTRACT

Part 1 - VCO Based Chopping for Sensor Interface Applications

Abstract- The main challenges in integrated sensor for IoT applications are often the accuracy, silicon area and batter life of the sensor interface circuit. One of the main contributors to these tradeoffs is the flicker noise which heavily impacts lower frequency band. To combat flicker noise, various techniques have been explored in past few decades. The two most commonly used are correlated double sampling (CDS) and chopper modulation. While CDS filters the flicker noise, it will result in noise aliasing which will result in poor overall noise performance. On the other hand, chopping modulates the low-frequency components including flicker noise and offset to higher frequency where it will be filtered by a low-pass filter. However, chopping results in aliased noise floor and out of band modulations. In this work, we present a new nanowatt sensor front-end circuitry using VCO based chopping which not only reduces the out of band modulation tones, but also serves as quantizer.

Part 2 - Multi-Loop Delta-Sigma ADCs

Abstract- In this talk, I will present several new approaches to improve the efficiency loop structure of delta-sigma ADCs, by building upon our previous efforts on Sturdy-MASH and Correlated Dual Loop DSMs. All of the proposed structures are verified with silicon measurements to prove their effectiveness and efficiency.