

Embedded Demonstrator for Audio Manipulation

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The embedded audio demonstrator, seen in Figure 1, demonstrates the effects of sampling and filtering through manipulation of analog audio signals on Altera's DE2 board.

MOTIVATION

Sampling of audio signals is the process of converting the analog music to a digital representation for manipulation, transmission or storage in the digital domain [1]. On standard CD discs, the sample rate is 44,1 kHz, meaning that the analog audio signal is sampled every 1/44100 second. The Nyquist theorem states that the sample rate must be at least twice as high as the highest frequency in the sampled signal in order to recover the analog signal completely from the digital domain. The audio demonstrator provides an adjustable sample rate with rates both above and below the Nyquist frequency, making it possible to study how the quality of the perceived sound changes with the sample rate.

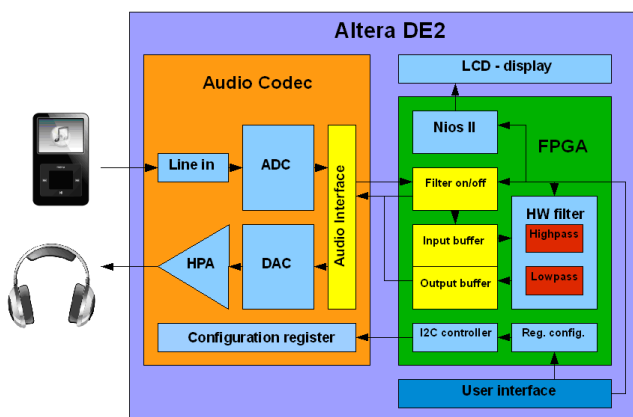


Figure 1: Altera DE2 development board

Digital filters are present in many digital audio systems today, and provides equalizers and sound manipulation in MP3-players, amplifiers and TVs [1]. In order to demonstrate how filtering affects the sound signal, the audio demonstrator is designed with both high-pass- and low-pass filters, in addition to a user interface for filter characteristic control.

DEMONSTRATION

Figure 2 presents the signal flow in the audio demonstrator, and illustrates how the signal changes through the system.

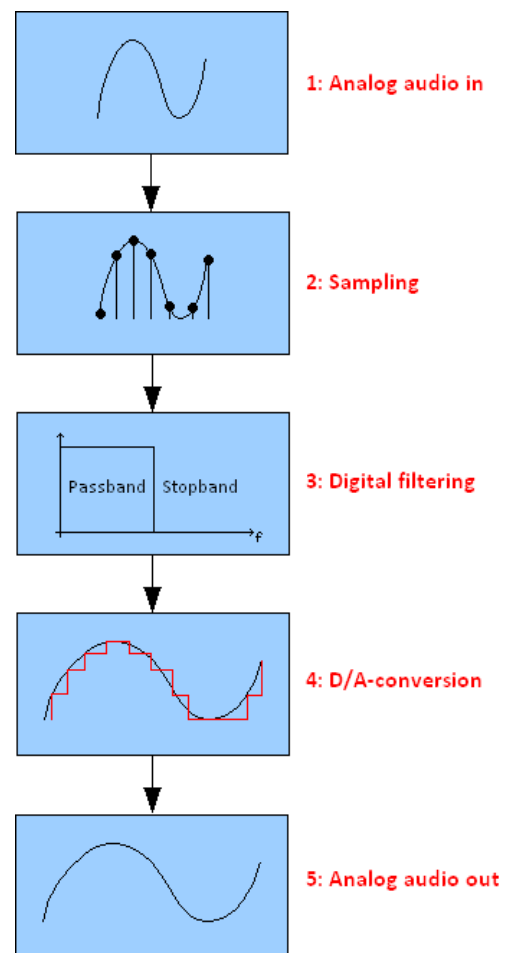


Figure 2: Signal flow in the audio demonstrator

REFERENCES

[1] – Larsen, J. *Embedded Demonstrator for Audio Manipulation*, 2010. Unpublished.

