

System Design Document

Audio digital signal processor

BeCreative Minor



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April 13, 2023

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Abbreviation List

Abbreviation	Explanation
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Table 1: List of commonly used Abbreviations

Chapter 1: Background

When listening to music it is of great importance that the speakers are tuned to the environment and the position of the listener. This is necessary to achieve the best experience. If the speakers are not correctly tuned to the surrounding environment, a digital signal processor (DSP) is used to correct this. A DSP is a specialized processor which is used for digital signal processing.

In the audio world a DSP is used to optimize a sound system. For example some speakers have some imperfections and a DSP can be used to correct for these imperfections. It is also often used to add more dynamics to sound.

Chapter 2: System context design

After the system requirement document has been approved, the system context diagram could be made (see figure 2.1). The block called "Audio DSP" is the heart of the system. This block represents the controller and thus the FPGA core. This system context design diagram fulfills all the requirements, including the should and could have. Therefore the Audio-DSP has four analogue inputs, one USB input and six analogue outputs. The input select line is for selecting what line input you want on input channel 1 and 2. The user can either select a RCA or 6.35mm jack input on input channel 1 and 2.

With a user interface the user is able to configure the effect parameters, equalizer settings and volume of each channel. The user is also able to rearrange the position of effects in the effects loop per channel.

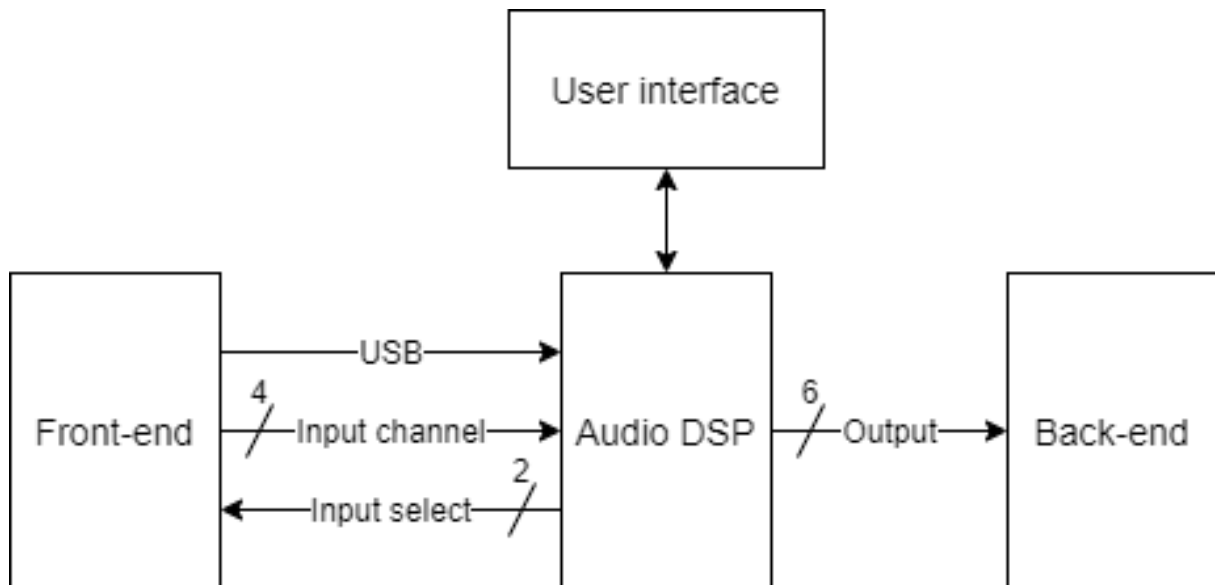


Figure 2.1: System context diagram of the top-level

2.1 Front-end

2.2 Audio-DSP

2.3 Back-end

2.4 User interface

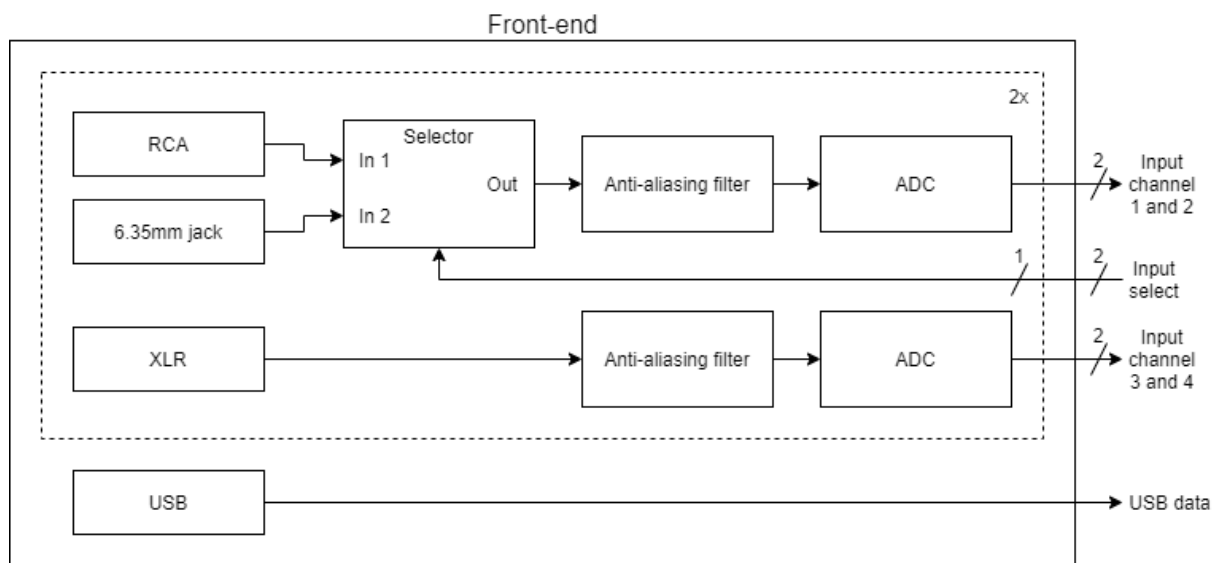


Figure 2.2: System context diagram of front-end design

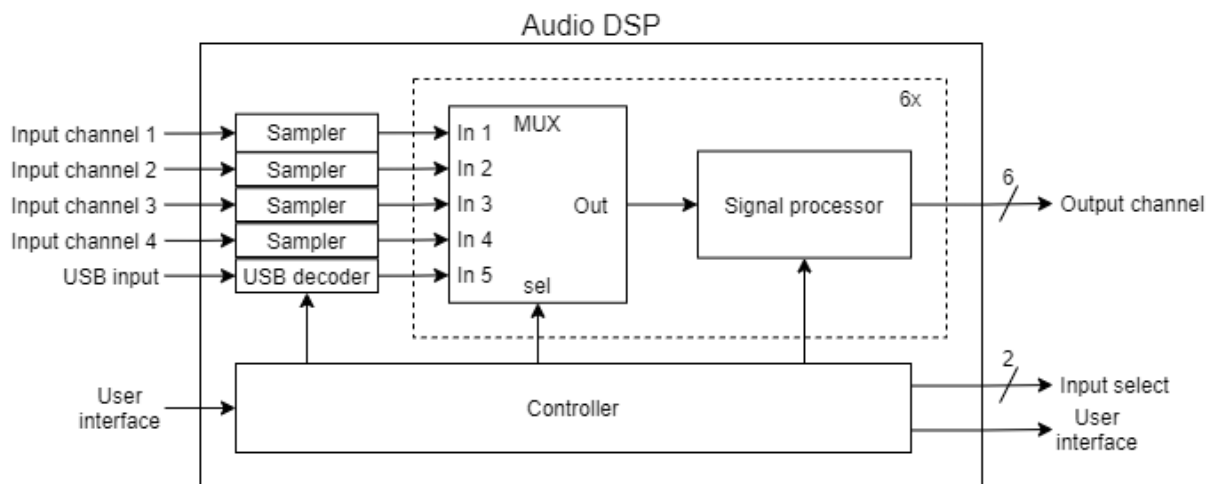


Figure 2.3: System context diagram of Audio-DSP

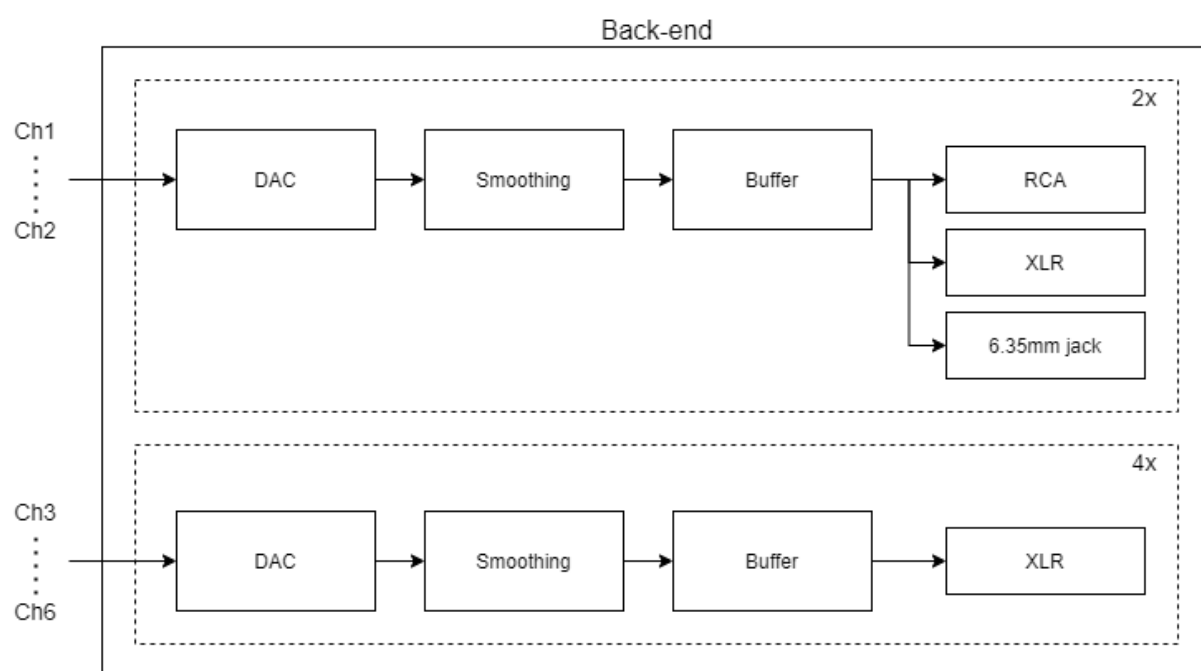


Figure 2.4: System context diagram of back-end

Chapter 3: System Architecture

introduction.

3.1 Audio-DSP

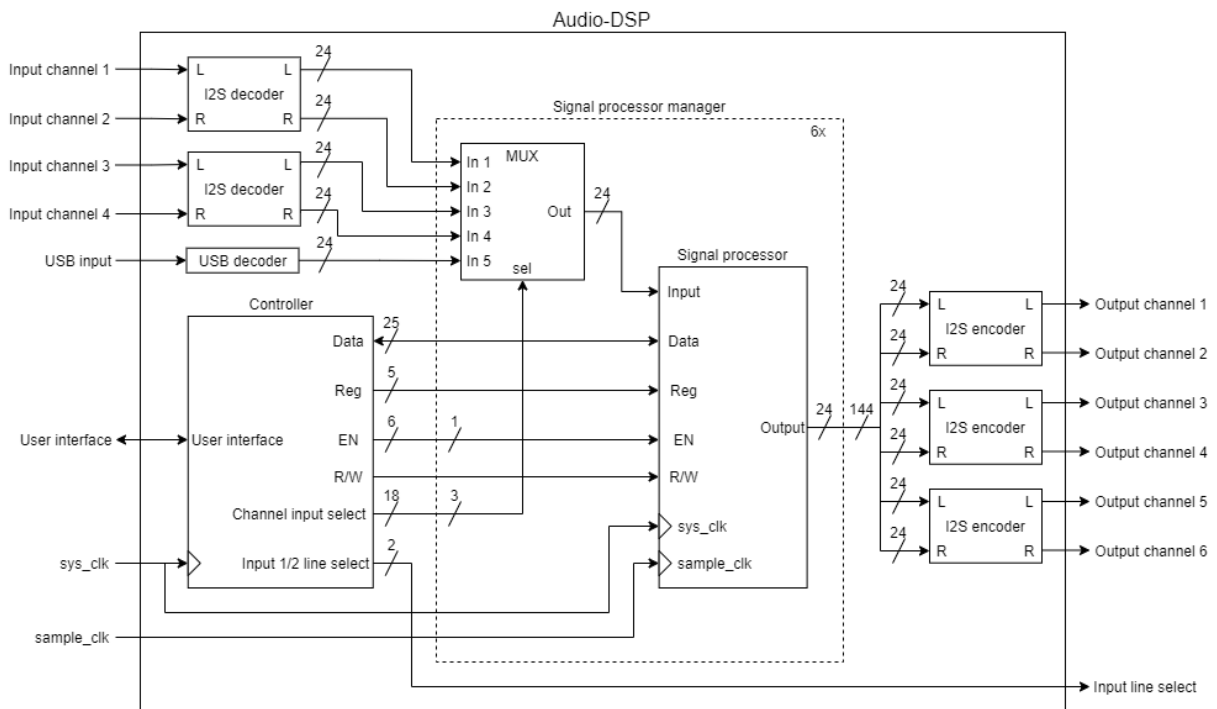


Figure 3.1: Top-level architecture of audio-DSP

3.1.1 Signal processor

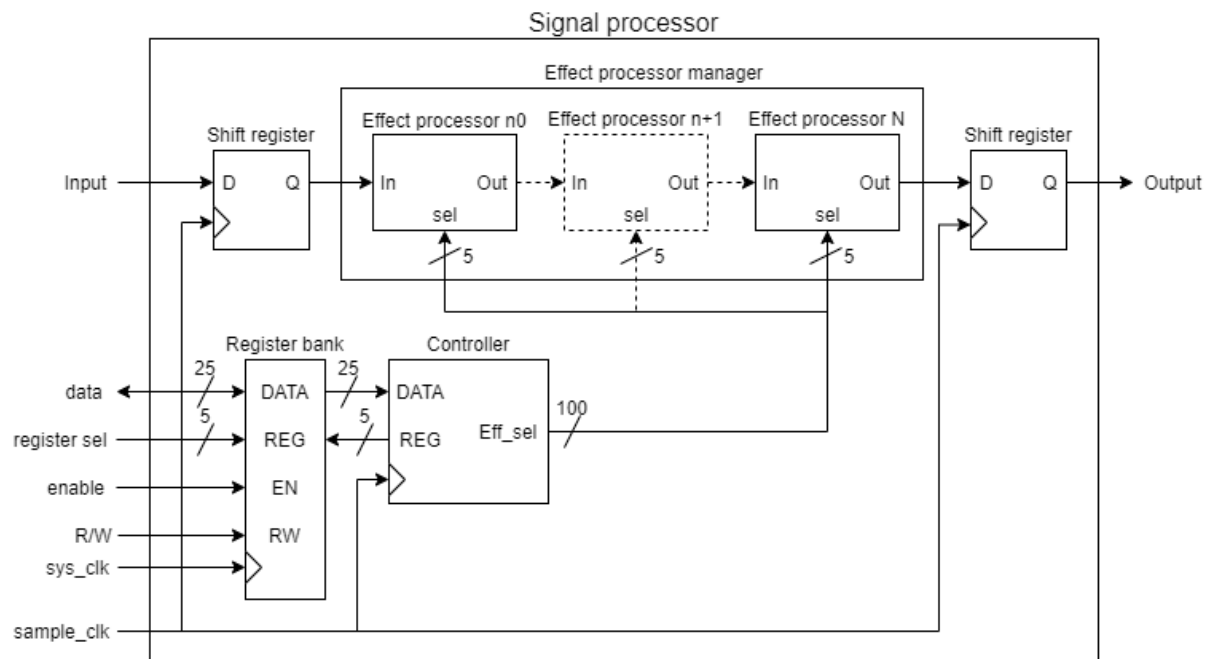


Figure 3.2: Signal processor architecture

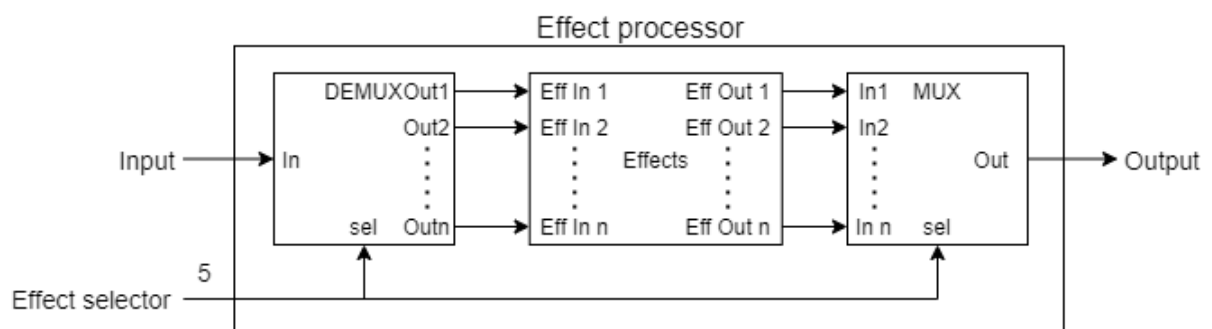


Figure 3.3: Effect processor architecture

Chapter 4: Detailed Design

4.1 Hardware Design

4.2 Software Design

Chapter 5: System Interfaces

Chapter 6: Human Machine Interface