pLayer-i
An internet based muzik player
[CSEE W4840 Project Proposal – March 2008]

Maninder Singh
ms3770@columbia.edu

Nishant R. Shah
nrs2127@columbia.edu

Ramachandran Shankar
rs2857@columbia.ed

1. Abstract

The need for dedicated hardware for multimedia decoding is rising with the increase in number of handheld devices with embedded device constraints on it, like power, area and precision.

2. Introduction

To Process the multimedia data (images, audio etc...) and distribute over a network their compressed versions are used. The simple reasoning behind this approach is to raise the bandwidth capacity to process task in real time and allow the content of signals to be suitable for the band-width of processing systems. Software is the most common tool used to decompress and use the data. Several SOC solutions have been developed but they are built around a RISC processor with a suitable ISA. But the demand of handheld players and multimedia in mobile phones has raised a need for a dedicated hardware to decode these file-formats with low power consumption and faster acceleration.

For the Embedded System Design class we would to propose to make an internet music player.

3. MP3 Decoding details

The decoding process is as shown in Figure 1.

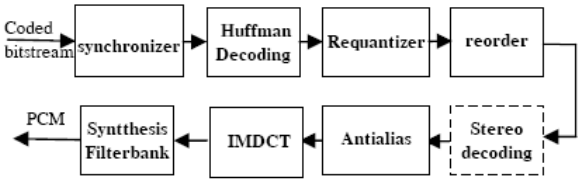

Figure 1. MP3 decoding process

1. The synchronizer block is used to determine the start of frame. This helps in determining the start of the next frame in case the current frame is interrupted.

2. Huffman decoding procedure is then done to map the Huffman codes onto the symbols using 32 Huffman tables.

3. The output from the decoder is 576 scaled frequency lines per granule which is reconstructed into original frequency lines using the requantizer.

4. Finally, the reordering block reorders the frequency lines within a granule. The way that the frequency lines are reordered depends on flags in the side information header.

5. The next 3 blocks i.e. the antialias, IMDCT and filerbank transform the frequency domain output generated into the time domain.

Implementation of the MP3 decoder would be the starting point of our project. The various modules will be divided among the group members as the process of decoding can be parallelized.

4. References

[1] FPGA based Architecture of MP3 Decoding Core for Multimedia Systems, Thuong Le- Tien, Vu Cao-Tuan, Chien Hoang-Dinh

[2] A hardware implementation of an MP3 decoder , Irina F¨altman, Marcus Hast, Andreas Lundgren, Suleyman Malki, Erik Montnemery, Anders Rangevall, Johannes Sandvall, Milan Stamenkovic

[3] A hardware MP3 decoder with low precision floating point intermediate storage , Andreas Ehliar, Johan Eilert