

Multi channel audio input over CSI-2 for Nvidia TX2 processor

Heterogeneous Processors (GPU and Quad Core Processor) like the Nvidia Tegra TX2 are able to process an abundance of data and therefore could be used for building audio mixing consoles with more than 100 channels. Unfortunately, most of those processors are limited to eight digital audio input channels. Alternatively, the PCIe interface could be used but has a long latency and requires expensive interfacing chips. Another possibility is to use the "Camera Serial Interface" (CSI-2), which is a feature of most heterogeneous processors. CSI's originally intent was to feed the signals of mobile phone video cameras into the processor, but can be used also for general purpose data.

The mission of this thesis was to build a digital audio (I2S) to CSI-2 interface in FPGA, to feed digital audio signals into a multicore processor and provide a Linux CSI-2 peripheral driver to make use of the audio signals inside the processor.

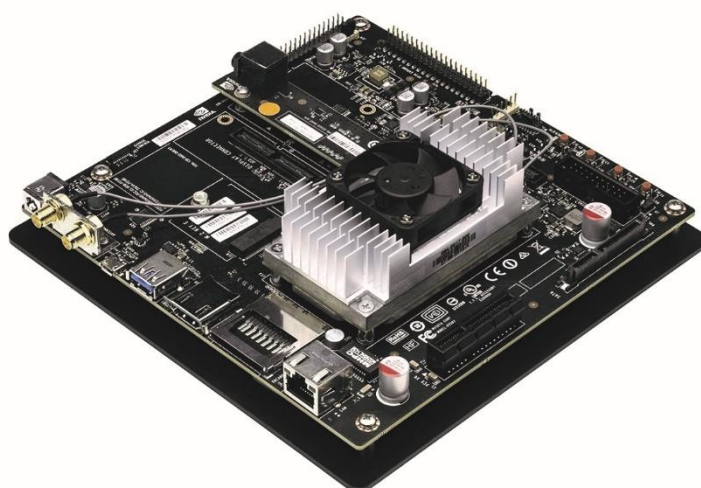
The proof of concept was realised with four stereo I2S interfaces, converted into a CSI-2 signal by a low cost FPGA. To prove the transmission of audio, signals received inside the processor are looped to the HDMI output of the processor. The transmitted audio is monitored with an 8-channel HDMI to analog audio converter box.

Since in this configuration, the CSI-2 interface is active only for 6% of the time, it is feasible to expand the number of channels and to increase the audio sample rate.



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NVIDIA-Tegra development board, which was used to prove the transmission of digital audio signals via Camera Serial Interface into a Tegra-TX1 processor. A Linux CSI-driver was written for this board to receive the CSI signals and loop them to the HDMI output of the board.