Unleashing Creativity with Zynq
1. Project presentation in pictures
   . 3 slides

2. Description of modules built with Vivado
   . 12 slides

3. Conclusions
   . 4 slides
High-End Audio Playback

2004: PC-based
• bulky
• >2 min to boot-up
• ~ $2000

2015: Zynq-based
• slim
• ~2 sec to boot-up
• ~ $200
Loudspeakers Setup

YL & Onken Horns with Compression Drivers (Japan), Altec Bass Cabinet (USA)
Quad-Amps Setup

Tact Audio Digital Amplifiers (USA), Rotel CD player (Japan)
Current Functionalities

✓ “Jukebox”-like Graphical User Interface
✓ Standard CD & High-Resolution Audio
✓ Digital Room Correction
✓ Digital Crossovers
✓ Upsampling
✓ System & Room Measurements
FPGA Programmable Logic

• TFT & Touch Panel interfaces
• PS/PL data transfers
• Crossover, Loudspeaker Time-Alignment and SPDIF output IP
• Upsampler
• SPDIF input
Measurements Configuration

- SPDIF time base (512 Fs)
- SPDIF Data (double FIFO)
- XOver & SPDIF out
- XOver & SPDIF out
- XOver & SPDIF out
- XOver & SPDIF out
- AD Converter PCM 3052
- PL
- CA9 Core #0 FreeRTOS
- SD drivers (DMA)
- 256GB SD card
- measurement files
- impulse responses
- PS
TFT Display
Resistive Touch Panel
PS/PL data transfers
Double-FIFO with DMA
Quad-Amps Crossovers
Crossover, Loudspeaker Time-Alignment and SPDIF_output IP

http://www.arc.id.au/FilterDesign.html
Crossovers Verification & Validation
Loopback Test SPDIF output to input
Upsampler

Converting the 44.1KHz sampling rate of standard CDs to 88.2KHz or 176.4KHz with:

Conclusions

Zynq-7000 All Programmable SoC

Combining the flexibility of software development with concurrent programmable hardware provides tremendous leverage to design great applications effectively.
Resources on Internet

1. Starting up with Vivado and Zynq
   http://svenand.blogdrive.com/archive/160.html#.VQf3MU10xIY

2. To get up to cruising speed
   http://zynqhowto.blogspot.kr/

3. AXI, don't leave home without it!
   http://www.googoolia.com/wp/category/zynq-training/
Special Thanks

- **Digital Room Correction**: Denis Sbragion
- **Crossover Articles**: Rod Elliott
- **SPDIF**: Mike Field and ACKspace
- **Upsampler**: William D. Richard
- **Vivado WebPack**: Xilinx Corp.
- **NETMF**: Microsoft Corp.
- **FreeRTOS**: Real Time Engineers Ltd.

and many others…
Free Open-Source Audio Project
Follow-up

- YouTube Videos
  https://www.youtube.com/watch?v=dTkPmM64F_U

- Forum
  https://parallella.org/forums/viewtopic.php?f=51&t=1752

Thank You...