Using SpartanXL for Low-cost Video Applications

A low-cost SpartanXL solution for driving a TFT LCD Panel with a graphical overlay.

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Here at Multi Video Designs, we recently completed a project for a prestigious French military customer. The design included a TFT LCD Panel using a video signal multiplexed with graphical data. The data was received from an external source through an RS232 interface, and then stored on-board.

The three key requirements of this application were:

- The interface must run at video data rates without any break in the output stream.
- Multiplexing between video and graphical data in one clock period.
- The solution must be as inexpensive as possible.

We decided to use a Xilinx FPGA, because we needed the ability to work with a pixel clock of 30 MHz. It also allowed us to use the pre-defined Dual-Port RAM and Multiplexer functions available in the Xilinx Logiblox generator. To keep costs as low as possible, we chose the XCS20XL-PQ208-4 from the Spartan family. The advantage of this solution is that we have a lot of possibilities, with very little hardware on board.

In this application, the FPGA is not configured by a PROM or an EEPROM, but by a microcontroller. The configuration file is stored in an external EEPROM, which is written to by the host via the RS232 line. This configuration gave us the ability to perform a lot of iterations of the configuration file without any hardware manipulation.

The EEPROM is also used to store the font characters. The user can ask for a character to be transferred to any position in the graphical RAM for display on screen. The user can also modify the font or generate graphical information via the RS232 line.

The internal resources of the FPGA allowed us to easily create multiplexers and FIFOs (32x16 bits and 32x8bits) with no implementation or timing problems. In addition, with a little hardware modification, we could easily drive more than one TFT screen.

Conclusion

The internal resources of Xilinx FPGAs are perfect for implementing low cost video applications. The on-chip FIFOs were critical components for developing this real-time video application, helping us to easily achieve our 30MHz performance requirements.

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