Digital Picture Frame:

Sam Toepke, Nenad Uzunovic
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Introduction:

Digital images have replaced film in the common household, and for good reason. Film is expensive, must be bought, must be inserted into the camera, taken out, and developed. Film is expensive, and the development process is time consuming. 'Hard' pictures degrade over time, cannot be manipulated, are costly, take up physical space (photo albums), and can be sent only as fast as the mail can go.

Digital images and cameras have vastly improved upon the old process of image capture/management. For a relatively low cost a digital camera can be bought with a memory stick, and then all the user has to do is point and click. The user will empty the images onto a computer when he feels like, then have an empty memory card ready to go. The images can be archived on disk, sent around the world instantly and can be manipulated using any one of the many programs for graphics.

To get digital pictures in a frame, the user will most likely print them out, then manually insert them into the frame. We suggesting a digital picture frame that allows the user to download the picture onto the picture frame module, then have the module display the picture onto a vga display.

Hardware:

The user will require their host computer with the JPEG already on it, the digital frame module, and display. Ideally, the module would be built into a flat panel display, so the flat panel could be hung on the wall similar to a normal picture frame. Power could be done through a battery, or through a hard-line that is in the wall behind the frame.

Flow:
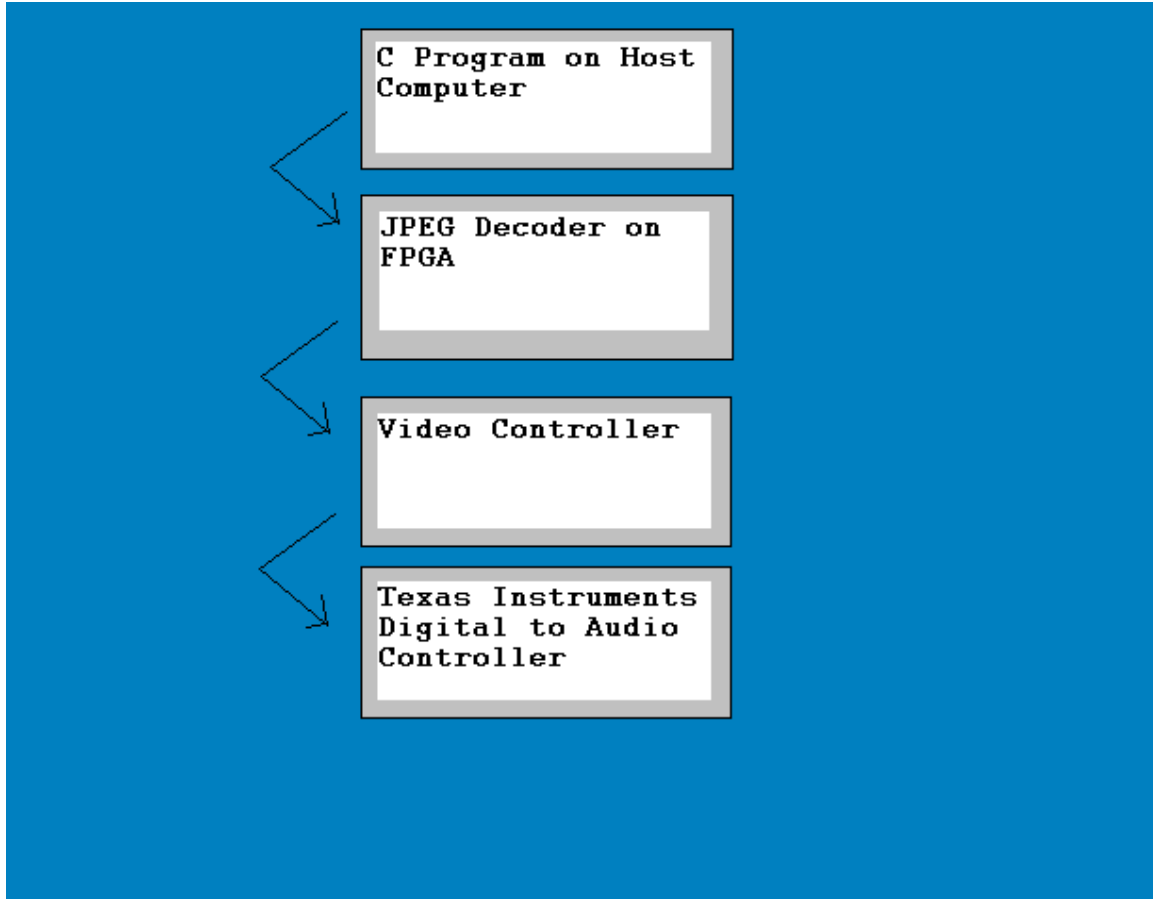
1. C Program on Host Computer
   Sends: JPEG through serial connector.
2. JPEG Decoder on FPGA
   Sends: Decoded JPEG
3. Video Controller
   Sends: Output to video digital to analog converter.
4. Texas Instruments On-Board DAC
   Controls the VGA to the monitor.

Implementation Specifics:

C Program on Host Computer:
We will use the host computer's serial port to transmit the JPEG image to the XESS XSB-300E board. The program that will be on the FPGA will grab the JPEG piece by piece, then process and display it.

JPEG Decoder:
We will download a JPEG decoder in C from the Independent JPEG group (http://www.ijg.org/), and adapt the code for our own purposes. Namely, we will streamline the code, leaving just the image conversion processes. We want the code to be able to fit onto the MicroBlaze processor and run smoothly.

Video Controller: We'll use vga.vhd and vga_timing.vdh from last year's class per Professor Edwards's suggestion. Together the files will send bytes from memory to video.

Texas Instruments DAC:
Will be used to control the VGA output.

Conclusion:

This project will demonstrate:
1. Ability to transfer a file from a computer to the board and into viable memory.
2. Ability to access the jpeg file and feed it into a C decompression implementation.
3. Taking the resulting bitmap and inserting it into an adapted video controller that will properly output the bitmap to the screen.

Contact:
Samuel Toepke: slt2002@columbia.edu
Nenad Uzunovic nu2001@columbia.edu