ELEX 7660: Digital System Design
Composite Video Encoder with SPI Interface

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Abstract

The main objective of this project is to generate a black and white composite video signal that will drive a Cathode Ray Tube (CRT) television. To accomplish this, we will use hardware to create a basic video card for a CRT TV. We will be able to achieve a resolution of 240 x 320 pixels on the screen.

The major components of this design include a digital interface for a processor, we will first use SPI, as it is simple to implement and will make the use of this device comparable to the Nokia 5110 LCD screen. Secondly, a storage buffer will need to be implemented that can handle different rates of data being written to and read from it. Lastly, there will be an encoder module which parses the storage buffer and generates the composite video via DAC.

We currently have a black and white CRT television that will allow us to accomplish most of our goals. We will need to find a colour television if we get to the point of adding colour capability to the video card. For driving electronics, we also already have what we need in order to implement a simple, lopsided resistor DAC that will generate the correct voltage levels for composite video. Once we start adding shading, we will have to incorporate a higher quality DAC. At first glance, we need this DAC to have a parallel input to achieve fast conversion rates, and either 8 or 12 bit precision.

Out project goals are in order as follows. Controlling the CRT TV to display an alternating black and white signal. Increasing the depth of the black and white inputs to be able to display shades. Connecting a MSP430 through a SPI input and displaying the preprogrammed pong game on the CRT TV. Introducing color to our black and white CRT TV by using phase modulation superimposed on the analog input. Finally, we would add sound to our composite video card.