

Project Summary

When first devising this project I thought of how I could use my previous knowledge of the Quartus software, fpga, and a love for video games to develop a Tetris game. This project will solve the need of a retro game with a twist of ingenuity. This project will create a portable game system that plays Tetris and can be projected on anyone's monitor.

I approached this project by breaking the steps of the project into three main parts. The first part I developed was programming logic onto the fpga that will project a clear and whole image onto the vga monitor that I have in my possession. This part included me researching the timing specifications of my monitor. These timing specifications are responsible for aligning the image onto the monitor. I implemented a series of comparators to make sure the correct values of the timing specifications of being projected through the vga port. The second part I developed was the game logic. The game logic step required me to research the different shapes and user actions that are involved in the game of Tetris. I then had to devise a system that will take the user input for the shifting and rotating the blocks in the tetris game. I created a schematic that uses a series of blocks that include the game logic and the means of updating the location of the shapes based on the user's input. The last part I developed was combining the two previous parts so that the Tetris game gets projected on the monitor. The monitor will show a random block moving down and the move location and orientation based on the input of the user.

I have revised the game logic to make the most sense to the future implementer of this project. There were several iterations of the game logic that did not function as intended. The first lesson I learned from my hardships was that Time management is very important, but not as important as motivation. In my experience working on this project is that one hour of motivated work is more productive than several hours of just going through the motions. The next lesson I learned was how to effectively do research of something outside of my expertise and strong suit. I learned how to be resourceful and be optimistic when facing adversity in a situation full of confusion. The last lesson I learned was about myself. I had always known that programming was not my strong suit and going into this project I thought that I could devise a strategy to minimize the amount of programming I would have to do. During the planning of the game logic I realized that creating and shifting the blocks in tetris would be much more convoluted than without code. I learned that the reason programming is not my strong suit is because it truly does not suit me.

The project has taught me humility, project management skills and how to be creative in a means of programming a classic video game.

FPGA Tetris Via VGA Projection

Project first assigned. Initial thoughts and concerns for the project addressed. Block diagram and interface definitions created. Some materials collected. Research on what components are needed in schematic.

Material Collection and VGA Monitor Projection

Devise circuits that create the different shapes in the Tetris game. Devise game logic for user input. Each command designated to individual pushbuttons

Project Game Logic

Debug the Tetris game operation and/or projection. Debug the Tetris game operation and/or projection. Present project

Initial thoughts and research

Devise Game Logic

Implement and debugging

Complete material collection. Calculate v-sync and h-sync to project to monitor. Design PCB. Program FPGA to have the user input. Game logic research. First block checkoff.

Second block checkoff. Integrate the Tetris game to the display block and project the Tetris game onto monitor.