Final Project – Connect Four

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# Overview

For our final project, we want to implement the classical board game Connect Four using the FPGA.

# Game Rules

Connect Four is a board game played by two people. The game is played on a vertical 8x8 game board, with checker pieces of two different colors. Players take turns dropping pieces down vertical columns of the board. Since the board is vertical, pieces automatically drop to the lowest possible position. The game ends when there are four in a row, any direction (vertical, horizontal, or diagonal) of pieces on the board.

# Game Implementation

We plan on implementing the game using the FPGA. First off, we need to draw the game board using the VGA connector. The game board is a square checkerboard, 8x8, with a black border. Next, we plan on taking user input using the buttons on the FPGA. We will modify the debouncer from Lab 1 and 3. The left and right buttons will be used to move the selector around. The selector is an indicator to visually show where the next piece will drop. The priority encoder from Lab 2 will be used to check where the next piece should fall. Each piece is drawn as a circle within the checkerboard. To end a game, we will have a piece of logic to check after each turn if a win condition has been satisfied.

# Extras

After the game has been implemented on the FPGA, we would like to add a few more features to the game. Other buttons will be used to reset the game, and an undo button to undo the last move. Finally, we had the idea to implement a “what is my next move” feature, and to expand that into an AI to play against

# Grading Rubric

VGA Display – 35%

15% - VGA (Vsync / Hsync)

10% - Game Board

10% - Game pieces

Game Implementation – 40%

10% - Game Board Implementation

15% - Piece Selector and

15% - Win Condition Check

Extras – 25%

15% - Artificial Intelligence

10% - Reset

10% - Undo