Tic-Tac-Toe

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The Game

Tic-Tac-Toe is a game of strategy where you play against an opponent who place X's and O's one at a time on a 3x3 grid. The players can win by getting 3 blocks in a row going horizontal, vertical, or diagonal. If the grid fills with no winner then it is considered a "Cats Game".

About

- Different color blocks, red and green, were used for this version of the game.
- When a winner is determined the screen displays all the blocks of the grid to the color of the winner. The players will then press the reset button to start a new game
- If there is a “Cats Game” the screen will not change and the players will press the reset button to start a new game.
- Switches will be used to place the players color in the desired block of the grid.
- Buttons will be used to change the color for each player.

The Code

- VHDL blocks used in this project.
  - MUX
  - scoring_file
  - vga_display
  - Vga_ctrl_12b
  - mydebounce

VGA_Ctrl-12b

- Top File
- Used to port everything together in order to have key components such as HC, VC, and color
    - Vga_ctrl_simple is used to output HC,VC, and color
- The MUX is port mapped to provide the 9 different blocks, buttons, score count, etc.
- The scoring_file is port mapped to input the score count then output the winners color

VGA_display

- This code block allows the VGA display to be on
- It sets important parameters such as front/back porch values, pixel counts, etc.

Scoring_file

- This file sets up the rules to determine a winner
- It gives a series of If Statements to check if a player has won the game by checking if the 3 blocks going horizontal, vertical, or diagonal are the same color.
- The screen then turns the color of the player who has performed this task.

MUX

- This is where the game is set up.
- Each block of the grid is set to the corresponding switches (SW0-8) on the Nexys4 board.
  - SW0 = Top Left SW1 = Top Mid SW2 = Top Right
  - SW3 = Mid Left SW4 = Middle SW5 = Mid Right
  - SW6 = Bottom L SW7 = Bottom M SW8 = Bottom R
- Sets up the grid by setting the boundaries for each block.
- The color change is controlled by the 2 buttons (BTNL and BTNR) on the Nexys 4 board.
  - BTNL displayed Red and BTNR displayed Green.

Mydebounce

- Debouncing function to ensure that when the buttons are pressed there is no bouncing effect.
    - Used to ensure that there are no issues when changing colors between users

The Board

- Nexys4 Board
  - The board will be connected to the computer using a USB to Micro USB connector and connected to the screen using a VGA connector.
  - SW 0-8 correspond to each block on the grid. The grid will be displayed on the VGA screen.
  - The buttons BTNL and BTNR control the color change.