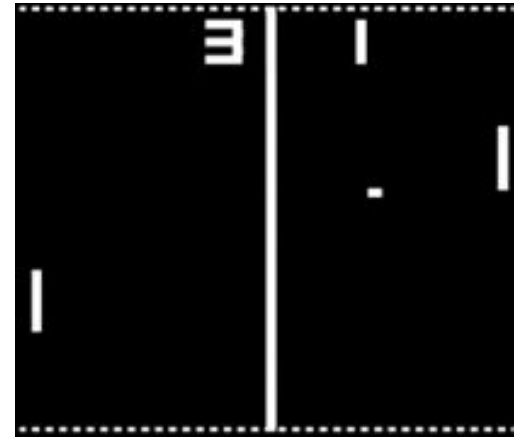# Digital Pong Table Tennis Game

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Introduction

- Design and simulation of a classic game of Pong
- 2D game that is played by passing the ball to each other until one player scores.
- Multiplayer game
- Score is kept on the 7-segment display
- The game restarts when one player loses and a new ball generates.

HARDWARE SETUP

For the setup of the project we used:

- Vivado 2021.1 Software

- Nexys4 DDR FPGA Board
- CPU Reset Button
- Switch
- 7 segment display
- Buttons

- VGA Monitor Display
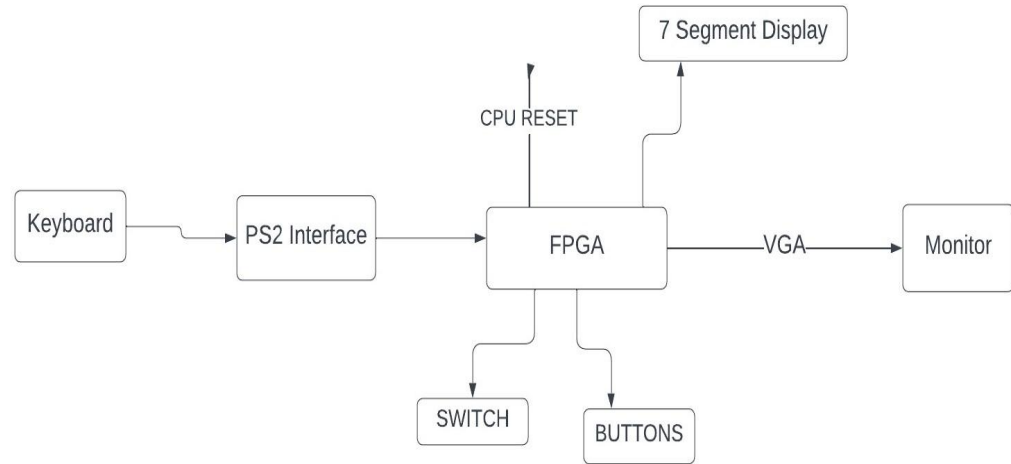
Methodology

- PVP game of Pong using the Nexys4 DDR board and Vivado software
- Player 1 (left and bottom btn) and Player 2 (top btn and right btn) controlled by Keyboard or buttons on the board
- Pong sprites controlled/displayed by the VGA peripheral/monitor and FSM (Game logic)
- FSM (Game Logic) updates state of game and number of games played on the 7-segment display
- FSM accepts inputs from reset button and start switch to begin/reset game
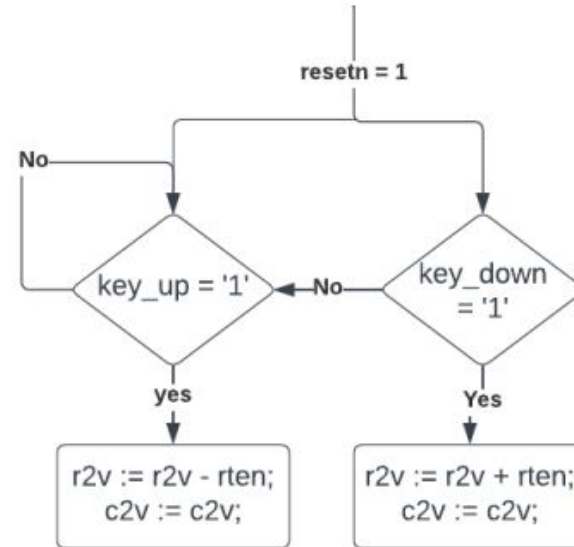- Game ends after matches played reaches 9
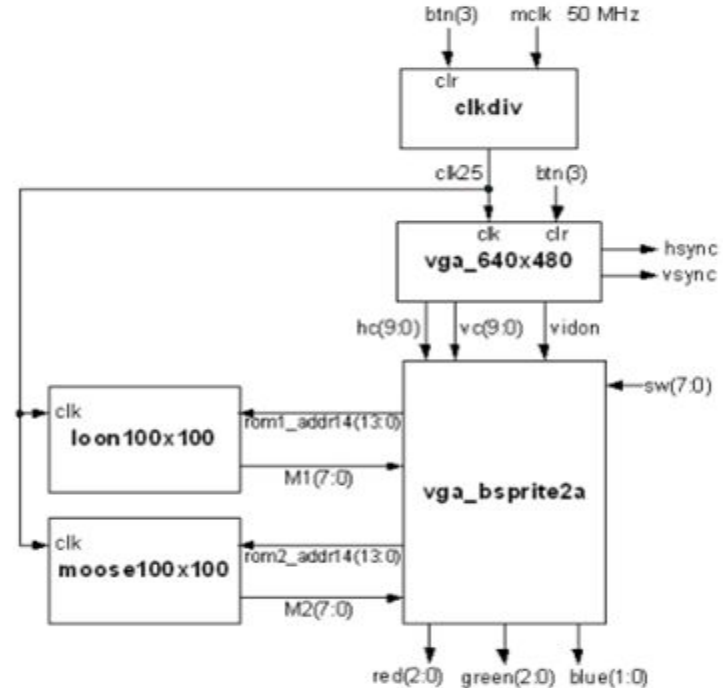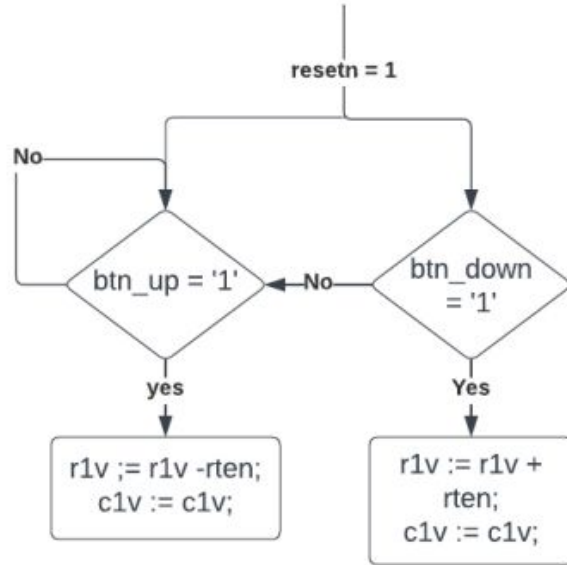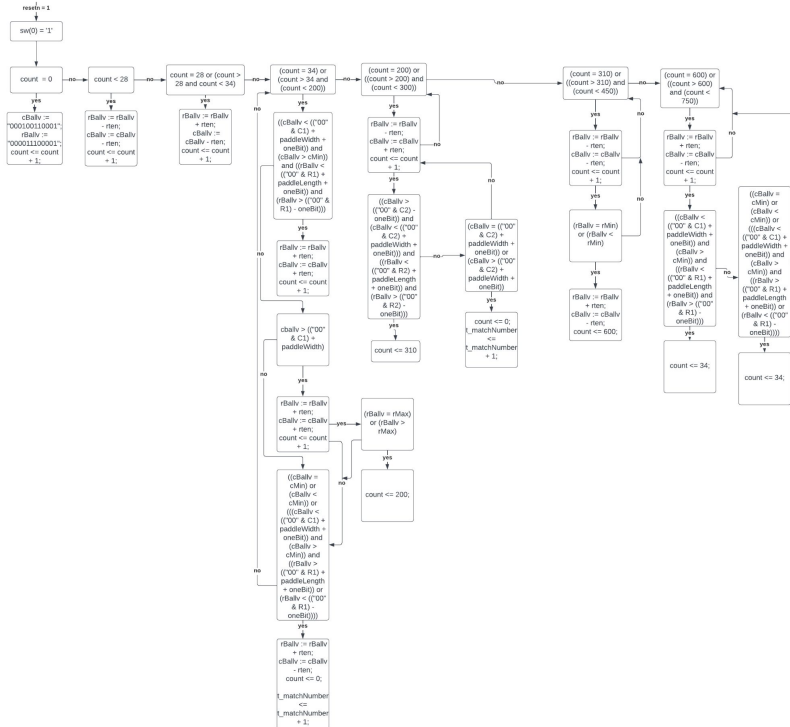
Block Diagram
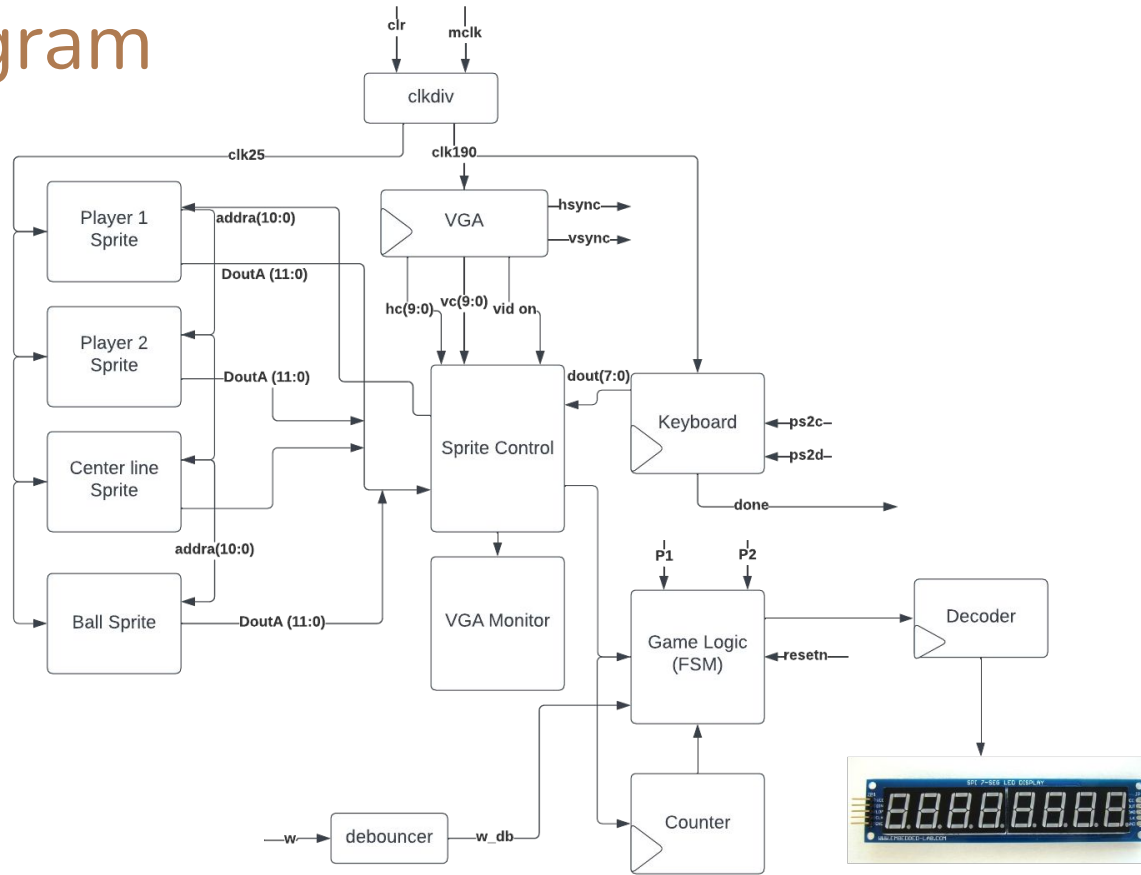
FSM
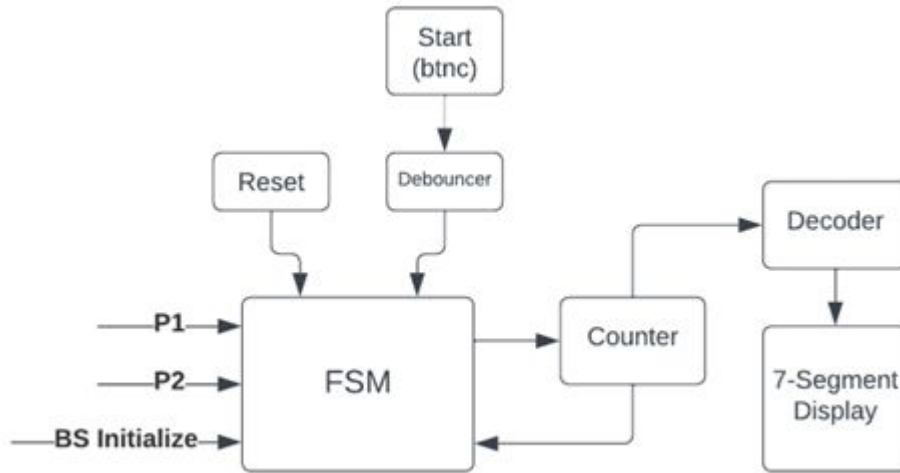
- ➢ FSM accepts inputs from Reset and start switch.
- ➢ Receives input from score counter to determine:
- ● The side of the screen the ball will start.
- ● Change the state to GAME OVER when one player reaches 9 points.

FSM of the Players/Paddles
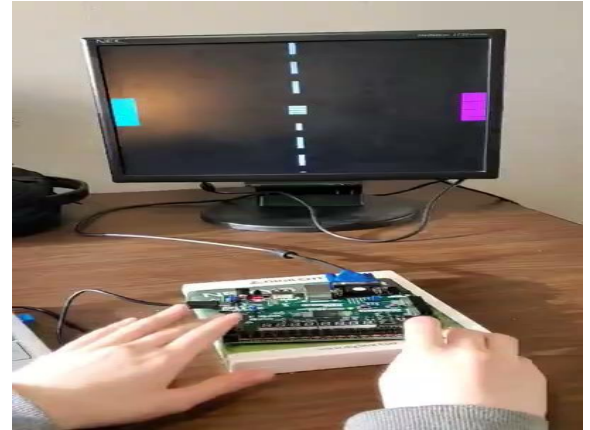
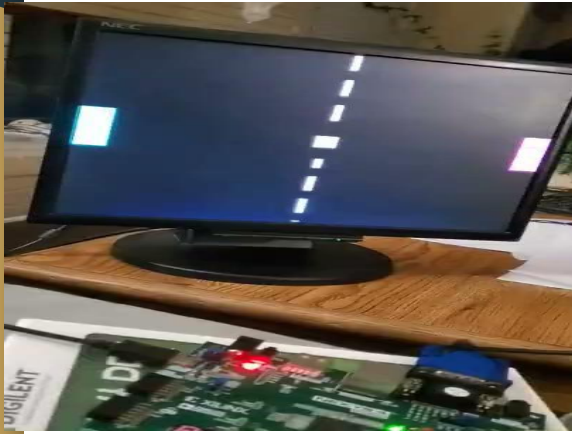# FSM of the Pong Ball Algorithm

Results

- Functioning multiplayer game of Pong
- Able to play using Keyboard/Buttons
- Watch the game on the VGA monitor.

Video Demonstration

Troubleshooting Teaser (left side), Video of the keyboard component (middle), and video of the game demo (right side)

Challenges

- Working with sprites.
- The ball is not bouncing at all angles as it is not a AI trained module.
- Moving the sprites & controlling their addresses in correspondence to address of the AI ball.
- Implementing a multiplayer keyboard.

Improvements

- Add levels once a player reaches a certain score.
- Add background picture at each level.
- Add a trained AI ball.
- Add limits to the paddle.