COI 215

Mini Project

Ping-Pong Game on VGA

Introduction and gameplay

In this project, we have implemented the classic Ping-Pong game on a VGA monitor.

“Ping Pong” is a game with 2 players p1 and p2. The players are fighting for points. The p1 controls a blue rectangular paddle and the p2 controls a red rectangular paddle. The ball is a small green square that bounce from one board to another and also from the left and right walls. The background of the game is black . The losing occurs when a player isn’t able to catch the ball and the ball passes by him, and so the other player gains a point. This happens until one player reaches a score of 10 points and then the game starts again from score 0-0 . The design is complete, meets most of the requirements, and it has been verified by physical implementation.

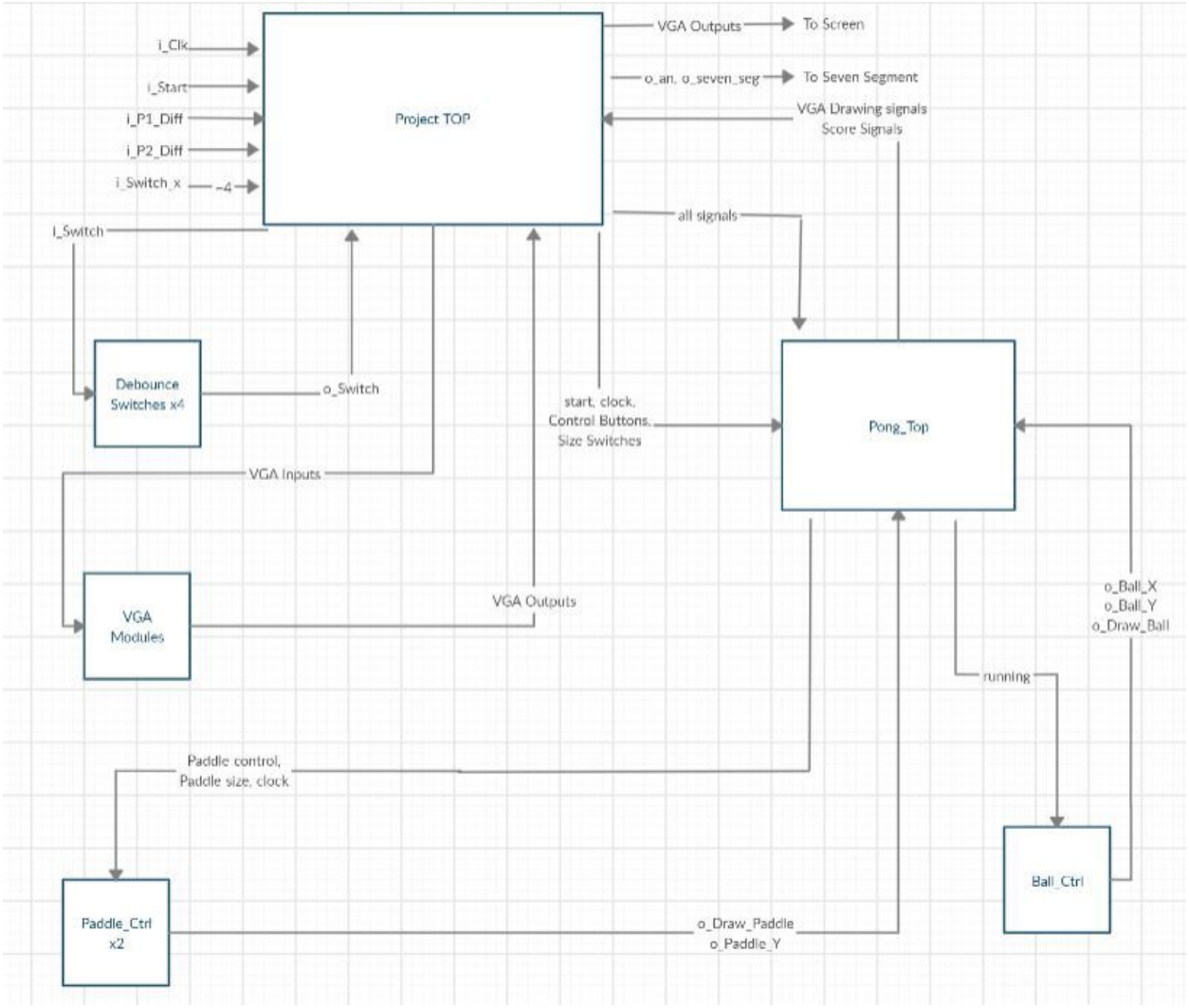
Each player has 4 difficulty level options , it’s up to the player to adjust difficulty level at start of the game i.e when score is 0-0 and game is in idle state. Difficulty levels are on the basis of size of paddle of respective player, as difficulty increases the size of paddle decreases, making it difficult for player to return the ball. These levels are changed by switches on the basys board . left most two switches for right player and rightmost two switches for left player.

Level	Input by switches	Paddle Height(in pixels)
1	00	120
2	01	100
3	11	80
4	10	60

Also the ball's speed increases after every bounce in a rally till it reaches a maximum set limit . If rally is broken, then speed starts from initial set value.we are using the push-buttons on the basys board to control the paddles. Player 1 is going to use Switches 1 and 2, Player 2 is going to use Switches 3 and 4 and middle switch is the start button.

Design and implementation

In this project we have made the following modules. Their purpose are written below below:--



1)Debounce_Switch:: The purpose of this module is to debounce any button on fpga board. It does not allow the output of the switch to change unless the switch is steady for 10 milliseconds.

2)Pong_Ball_Ctrl:: As the name suggests, this module is for defining the movements and controls of the ball. It returns signals to draw ball on the VGA output.

3)Pong_Paddle_Ctrl:: As the name suggests, this module is for defining the movements and controls of the paddles. It gives out VGA Output similar to Pong_Ball_Ctrl

4)Pong_Pkg:: This module contains all global constants such as default speeds, game board dimensions, default paddle height, width, etc.

5)Pong_Top:: This module is next to top in hierarchy and contains most of the logic. It instantiates Pong ball and paddle controls and defines logic for win loss and point scoring. It also defines Data for the VGA Modules to print the output.

6)VGA Modules:: The VGA modules, namely VGA_Sync_Porch, VGA_Sync_Pulses, VGA_Sync_to_Count have been borrowed from a project on the web. We have understood the basic working of the code and used it in our project as per requirement.

7)Project (Top Module) :: This is the top module that instantiates all the modules and makes them work in parallel and transfers data between them.