# Pong Game

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1 Topic
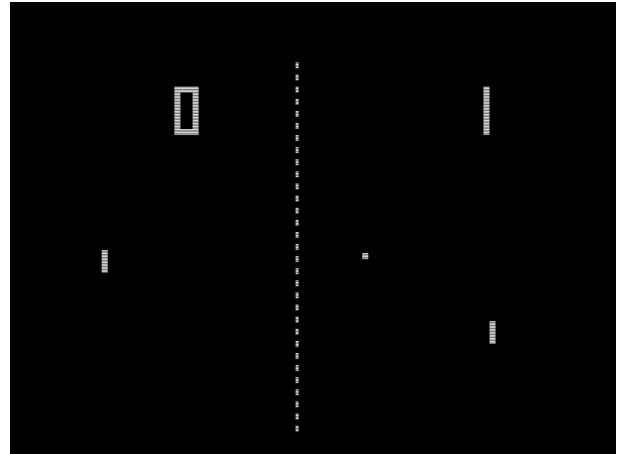
1.1 Brief Task Description

This project is about implementing the game Pong on the Atlys Spartan-6 FPGA board. Pong is a two dimensional multiplayer game that simulates table-tennis. Each of the two players controls an in game paddle by moving it vertically in order to hit a ball back and forth. A player scores a point when the opponent fails to return the ball.

We also took advantage of the built-in HDMI port and the AC-97 Codec to produce a better image and audio quality output.

Figure 1 shows a picture of the used board, and a screenshot of the (yet to be) realized game.
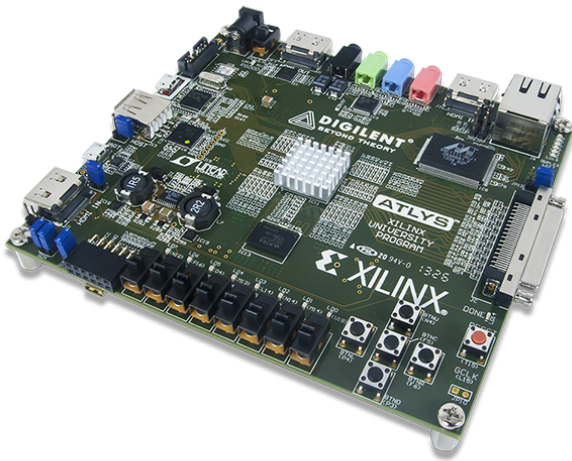
(a) Atlys Spartan-6 board   (b) Screenshot of the game Pong

Figure 1: Used board and screenshot of the game

1.2 Block Diagrams

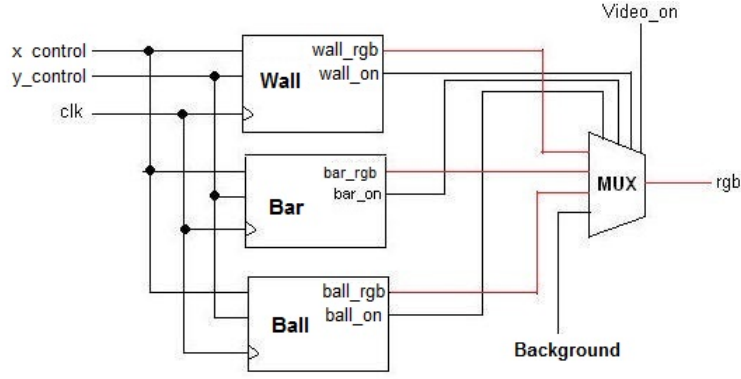Figure 2 shows the block diagram of the module `image_generator_c`.
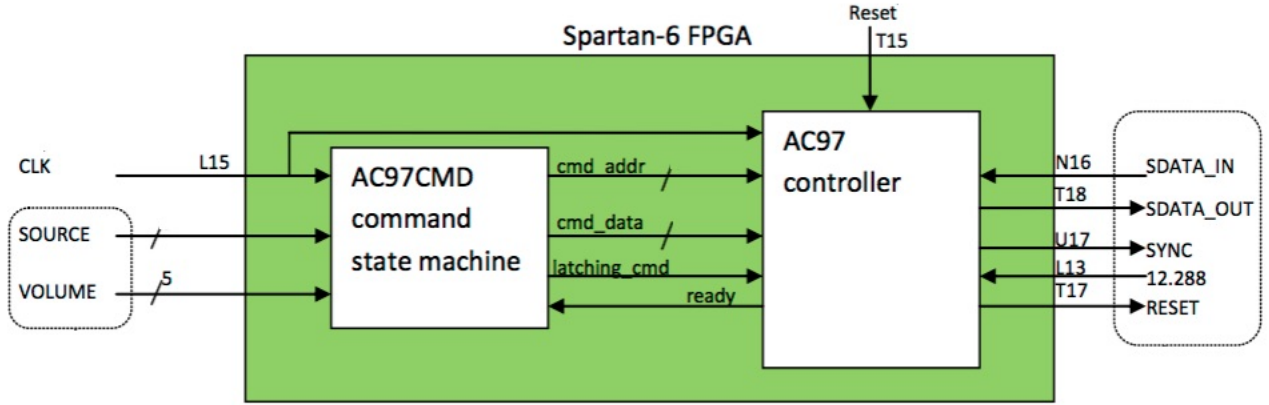
Figure 2: Schematic of Image Generator

Figure 3: Schematic of Image Generator

1.3 Functional Details

1.3.1 Image Generator

The Image Generator takes inputs from the players and outputs the video that can be displayed through the HDMI interface of the Atlys board. The panels shown in figure **??** are submodules of the module `image_generator_c`. This module calculates the movement of the ball and movement the two panels that are controlled by the players.

The movement of the ball is done by the `ball_c` module. (see next Section for more details on implementation). After a well determined time frame, the ball's movement direction is determined and the next `x_pos` and `y_pos` are either incremented or decremented.

The module `panel_c` determines the y-coordinate of on panel based on the player input. For instance, pressing `btn_up` increments the `y_pos` signal if the panel did not reach the top edge already.

1.3.2 Sound Generator

In order to generate sound, we used the on board LM4550 chip

2 Implementation

2.1 Video Controller

2.1.1 VGA Controller

2.1.2 HDMI Controller

2.2 Image Generator

2.3 Match Controller

2.4 Sound Generator

3 Implementation

3.1 Modules

3.2 Results

3.2.1 Synthesis and Implementation results

3.3 Problems

4   Assessment

5 Summary

6 Attachment