BLASTER BALL

02321 HW/SW Programming

Project   January 2014

The goal of the 3-week project was to implement a LC3 computer on a FPGA (Field-programmable gate array). We had also been given the task of implement a game of our own choice. The game had to be written in the programming language C and run on the LC3 computer.
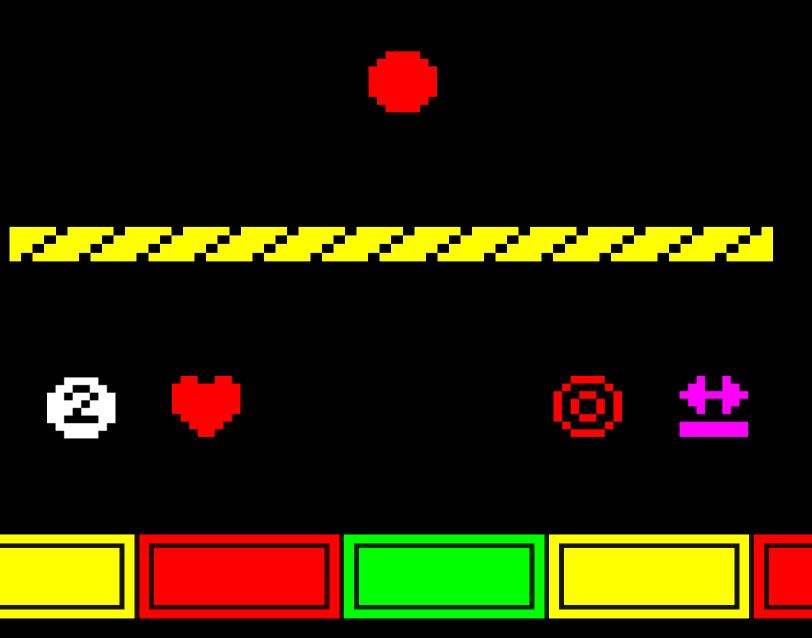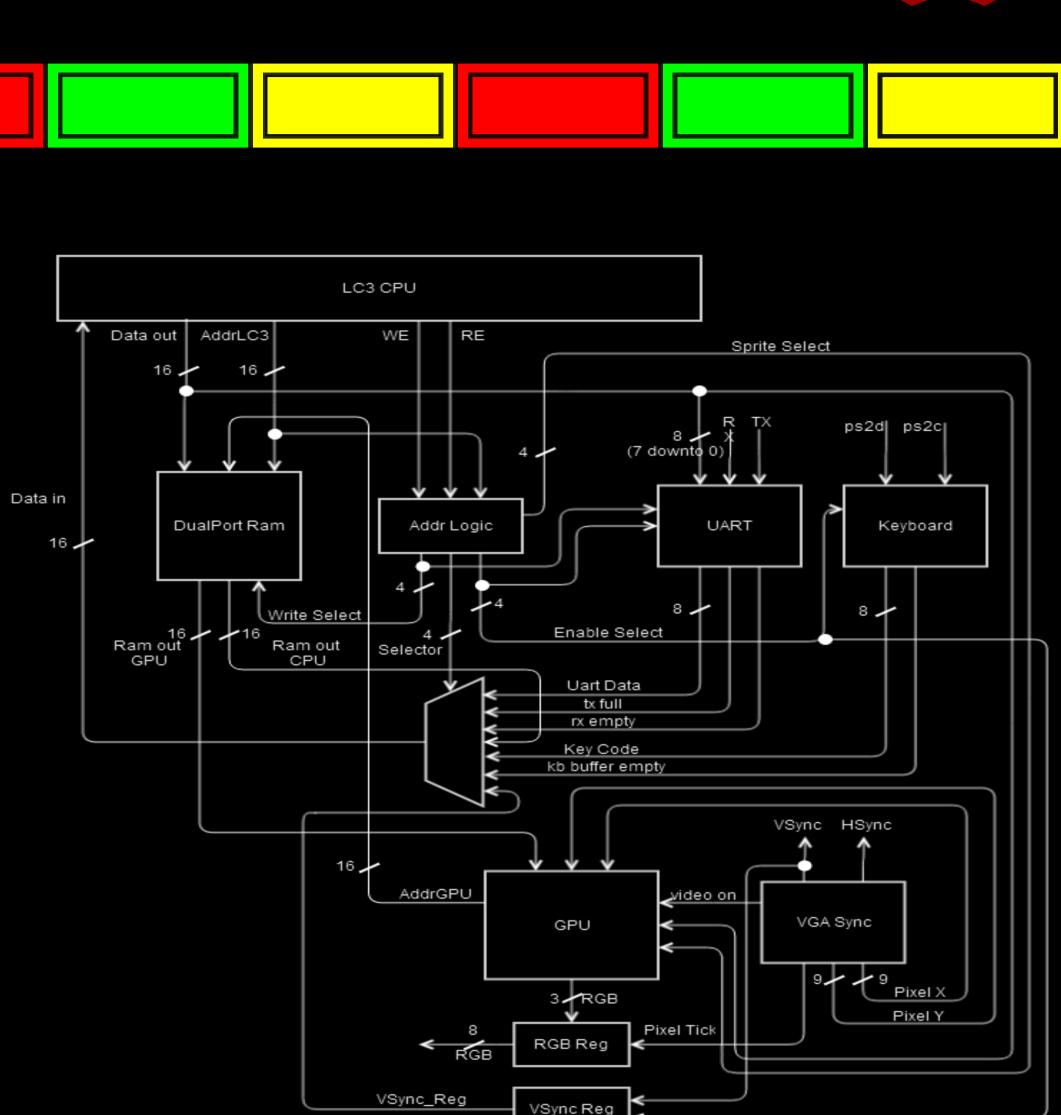

Gameplay

Blaster Ball is a new take on the original Breakout game. The goal of the game is to break all the blocks located at the top of the screen, using a paddle to bounce a ball into the blocks. The paddle can be moved left and right using the arrow keys on the keyboard, and the blocks break on contact with the ball. Blaster Ball features Power-Ups as seen on the bottom of this poster. On the far left we have the Split-Ball Power-Up. This sweat-inducing Power-Up splits your ball into two, thus allowing you to break twice as many blocks. The Heart Power-Up grants you an additional life, keeping you in the game to the very end. The Fireball switches your normal ball for a fiery ball of destruction, allowing it to penetrate all the blocks in its path. Last but not least the Grow-Paddle Power-Up makes your paddle grow in size. Be sure to pick up every one of these, as they keep on increasing the size of your paddle, even after the first pickup!

Try the game yourself and see if you can beat all the levels!

Blok Diagram – Full implementation

Design

The system is built on a FPGA, using the Hardware description language VDHL. We have implemented a fully operational computer system, using the components shown on the diagram above.

The CPU is running our program, which have been transfered to the memory by the UART, which is connected to our PC by a serial connection. All our graphics have been baked into the ROM of our hardware. The GPU reads a specific part of our memory, which contains data about which characters to draw, and where they should be located on the screen.

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