

(E): Eddie (I): Irene (I & E): Both

The Controller

- (E) Convert camera input to a 24-bit YCrCb data stream
- (E) Use the ZBT memory as a buffer for the camera data
- (E) Display a low-quality RGB camera image on demand
- (E) Locate a point representing the center of all high-intensity green light in the current frame
- (E) Track the movement of the center-of-light point over time and generate a velocity vector (containing basic speed and direction information) for game use

The Game (Super Breakout)

- (I) Display game on screen when necessary
- (I) Basic game functionality (i.e., it runs, logically and graphically)
- (I) Generate bricks from a .coe file containing a list display information, including brick color and visibility, but draw the bricks using in-game logic
- (I) Break up the screen into an 8 x 24 grid for brick display purposes
- (I) On reset, regenerate bricks from a read-only BRAM
- (I) Visually represent (brick color) the number of hits remaining to break a brick
- (I) Collision detection
- (I) Read the ball image from memory
- (E) Some collisions with the paddle will reasonably change the ball's velocity
- (I) Keep track of the current player score
- (E) Display the current score and the high score on the LED display during play, and (if time) allow this information to be accessed in other modes of operation
- (I & E) Create multiple levels

If we have time:

- (E) Player-defined block-collision sound effects
- (E) Show a brief inter-title between levels, and at game completion
- (I) Have game-affecting items fall from bricks as they break
- (I) Spruce up the game with a background and other aesthetic details

Extras

- (E) Create a drawing applet that visually demonstrates the controller's center-of-light and velocity functionalities.
- (E) Convert a 32-bit hexadecimal number into base-10 representation so that a number displayed on the LEDs (for example, a game score) will be readable for the layperson who only understands base-10 notation (somebody who clearly never took 6.111)
- (E) Allow switching between character and hexadecimal LED display options
- (E) Intuitively configure the buttons and switches on the FPGA and refresh on mode changes so that the user can easily switch between the operation states.

If we have time:

- (I & E) Create a short mini-game to give the user another play option