Frogger Market Analysis

The system I have developed is an implementation of the Frogger game, using a 16x16 LED board as the playing field. Players control the frog with 4 input keys, one for left, right, up, and down movements for the frog light. This design makes the game easy to play, all the players must do is switch on the game using a switch located on the DE1_SoC, and then they are free to start playing with the four keys.

In my design, to win the game you must get from the bottom of the board to the top with your frog ten times without colliding with a red light. This makes the game challenging enough to be interesting but not too hard that it feels impossible. Each time you lose you can start right over again with 0 points. The ease of getting right back into the game after a loss is extremely important in keeping people playing. A score counter on the DE1_SoC shows your current score to let you know how close you are to winning throughout and it also has a specialized win and loss message for the user. Features like this make the experience more fun and increase the likelihood that a player will continue playing or recommend the game to other people.

Another way my design makes the game interesting for the player is by randomizing the behavior of the “cars” (red lights) crossing the rows that the frog must avoid. A row can either be a car row, truck row, or a river row. Each row has its own challenges, and the row types are randomly selected each time the playfield is reset. This variety makes the game very exciting for the player, and the randomness of each of these features keeps the game fresh for the player as they work towards beating the game.

From a technical standpoint, this game uses 1600 ALUTS and 950 logic registers. This is quite complex and uses a significant amount of hardware. However, compared to the total available resources of the FPGA that the game is run on the game the complexity is not a serious issue. While resource usage is not an issue, the cost of the board that the game runs on is expensive compared to the overall value that the game provides. The game is enjoyable and exciting but not worth buying a DE1_SoC board to play on.

Overall, my Frogger game meets expectations of consumers in terms of accessibility, usability, and enjoyment but may not provide a good enough experience to justify the cost. If a person already has a board to play the game on, the game would be worth their time regardless of age or skill level.

User Manual

Turn on the DE1_SoC board and start running the game from your computer. Switch SW[9] on the DE1_SoC board on and then back off to boot up the game. To play on easy mode keep SW[8] off when starting the game. To play on hard mode switch on SW[8] before starting the game. Easy mode means that every other row will have lights moving across it that you must avoid with the frog. Hard mode means that every row will have lights that you must avoid. Each row is randomly selected to be a car, truck, or river row. A car row has singular lights shifting across it in a randomly selected direction and at a randomly selected frequency. Each shift occurs at the same time, but the frequency of lights is random. A truck row is the same as a car row, but two lights will represent the truck instead of one for the car so two lights in a row will move across the row. A river row does not shift and is almost entirely filled with red lights, except for 2 gaps that you are able to move your frog through. When the game begins, your frog (green LED) starts at the bottom of the board, and you must successfully get the frog to the top of the board without colliding with a red LED. You control the frog with 4 input keys that control up, down, left, and right movements for the frog. You can only move in a direction once per press of the key, so holding the key will not move your frog multiple times. Moving left and right off the board will wrap around to the other side of the board. The HEX displays on the DE1_SoC board will display the number of times you have gotten to the top of the board successfully in a row, up to 10 times. If you collide your frog with a red LED, it will display a LOSE message and the game will reset. The message will stay on until you start the next game which you can do just by pressing an input key. After ten wins in a row, there is a special winner message and the game restarts.