CSC258 Project Proposal

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What is the title of your project?

Snake Battle

Provide a one-paragraph description of your project.

Our project is to design a snake game with multi player feature enabled. The basic rule of the game followed normal snake game, which is our players will control snakes and try the best to eat as much snacks as they can before hitting themselves or walls. Any changes in game rule will be listed in the project description.

Project Description:

For this project, we are first going to design a finite state machine which helps to choose game states, specifically, the initial state will be start state(00), then if s is typed from keyboard, it will go to single player state(01), or if m is typed, it will go to multi player state(10). From each in game state(01 and 10), the current state will turn to game over state(11) if player’s snake died. After that, it can go back to starting state(00) once r is pressed. The state diagram will be shown below.



Below is the basic construction of our game design



In order to record the location of each snake, we are using 2 groups of shift registers (to store X and Y information), each register can store 8 bits of data since the screen resolution is 160 by 160. When the snake is moving, we left shift the value of each register. Meanwhile, we are going to record the least significant bit of the register, which is the head of the snake and check whether current location will finish the game or not after each move.

The snack will be generated randomly by randomly generating X and Y value, if generated X,Y value is in snake’s body, a new one will be regenerated.

For the speed increasing part, we are going to implement a rate divider and a counter, after certain number of seconds, the speed will increase once by decreasing the number in that rate divider.

What will you accomplish for the first milestone?

For the first milestone, we are going to make our snakes be able to move across any directions (left, right, up, down) on the screen, we will use [3:0] KEY to change direction for now. Moreover, snakes will die immediately after they hit any edge of the screen or themselves. Then, we will design a finite state machine which controls three states: starting state, in-game state, game-over state. Specifically, the game will start at starting state, once player presses correct key, game will switch to in-game state and snake starts moving, once snake died game will shift to game-over state and waiting player to press restart. For this section, all controls will be set on the FPGA board.

What will you accomplish for the second milestone?

(similar advice as above, but for the second part of your project. Remember to specify what inputs and outputs will be used for each milestone. If your project is a visual game for example, what will appear on the screen for each milestone, for example, static colored boxes in one milestone and moving boxes in the next one etc.)

For this milestone, we will add some new features on top of previous milestone, they are:

* Snacks will appear randomly on the screen and if eaten by snake, the length of snake body increments by 1 and a new snack will show up randomly.
* Meanwhile, we will add score system for the game, the score represents the length of the snake and it will increase for each snack eaten.
* Speed of snake will increase periodically. Specifically, we will increase the speed according to the current length.

The score output will appear on the right side of the screen, snake and snack output will appear on the screen with snack being a single yellow pixel and each unit of the snake body being a blue pixel.

For the second milestone, we add another feature: if the snake eats itself, the length of the snake will decrease by 1.

What will you accomplish for the third milestone?

(don't say "everything" just because this is the final milestone; describe the final components instead, and exactly what the TAs should expect to see)

The key features for this milestone are keyboard connection and multi player mode. When the game is in single player mode, the player will use WASD button on the keyboard to control the movement of the snake, and the space for restart. As for 2 players mode, the other player will use 8456 on the numberpad to control the movement of the other snake. Moreover, N will be used to start a single player game while M will be used to start a multi player game in the starting state, after selecting the mode, press enter to start the game.

For the multi player game, one will lose the game if his snake’s head touches the other snake’s body, and the color of the winner snake will show up on the screen.

For this part, all inputs will be on the keyboard as described above. Output snake1 stays the same format and each unit of snake2 body being a green pixel.

How does this project relate to material covered in CSC258?

We use finite state machine to control state of the game.

We use VGA to display our outputs.

We use clock and rate divider to control the pace of the game.

We use counter to record the score.

We use shift register to store snakes and increase its body length.

What's cool about this project (to CSC258 students and non-CSC258 students)?

Our game not only has single player mode, but also has a multi player mode which let you play with your friend, both of you have chances to beat each other.

Why does the idea of working on this appeal to you personally?

Personally, both of us like to play snake games, which are simple and classic. Additionally, we want to play against each other so that we add a multi player mode to this game.