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FPGA Final Project EE-201

1) Introduction

Game Description:

Tron. This classic game is a two player alternate of the well known game snake. Each player controls a “snake” which has a fixed origin and grows by one unit per time. A player can turn left or right but if they hit the trail of another player or their own they lose. The position grid will be 256 x 256.

User Interface:

The two players input their controls through a standard USB keyboard attached to the FPGA board. One player uses left and right keys while the other uses A and D for turning. Menus will display the proper key interfaces.

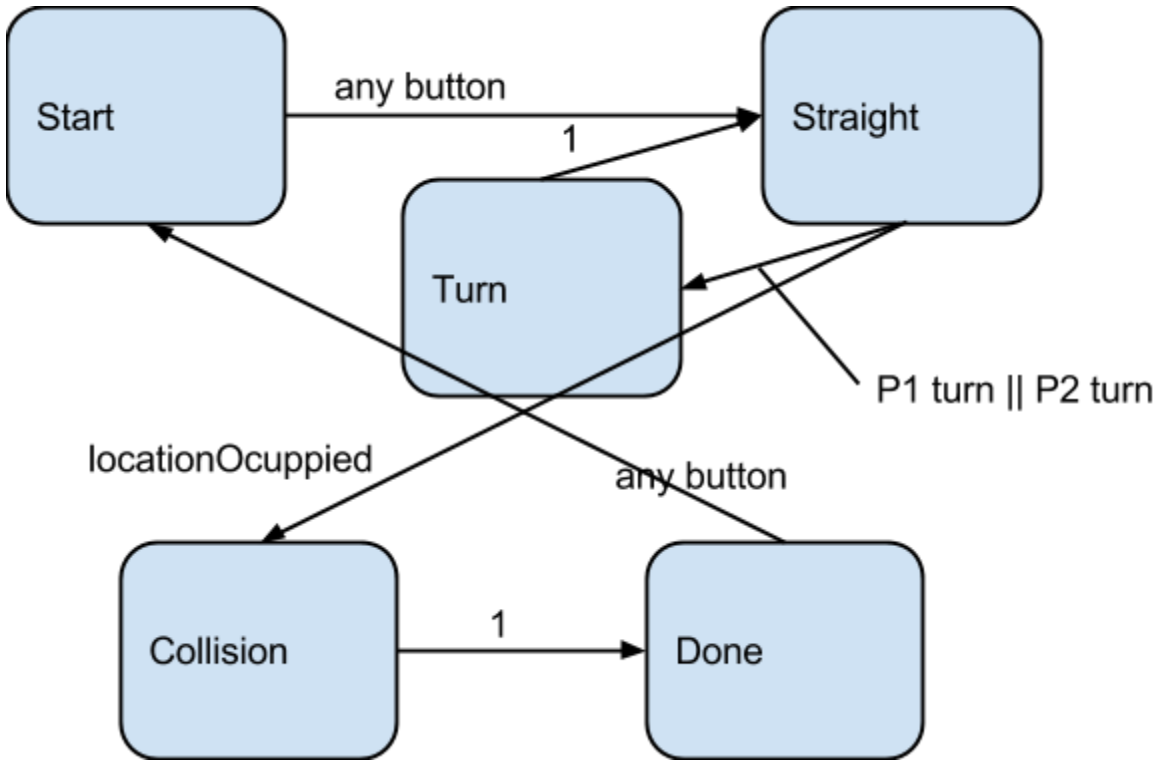
Scoring:

Each round there will be one winner and one loser and the win/lose count will be displayed on a scoreboard at the end of each round.

Display:

The game will be displayed over the VGA port onto any supported screen.

2) Design Spec



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IO:
keyboard module will tell us what keys were pressed and we will check for A, D, Left, and Right for the turn signals for P1 and P2.

Additional features:
we will use the VGA to display everything

Mealy/Moore:
Our design will be very Mealy.

Signals:
P1 L flag
P1 R flag
P2 L flag
P2 R flag
- all triggered on posedge of keyboard signal (debounced if necessary)

CurrentPosP1x (8bits)
- the current x position of player 1

CurrentPosP1y (8bits)
- the current y position of player 1

CurrentPosP2x (8bits)
- the current x position of player 2

CurrentPosP2y (8bits)
- the current y position of player 2

VisitedSquares (boolean array with one value per location) = (256*256/8) = 8192 bytes

(we will use the visited squares array to check for collisions and to generate the image sent to VGA)

Collision
- if there was a collision

gameclock
- a slowed down clock with a period of ~.1 seconds that updates the read-in from keyboard and makes the game run at a playable speed

3) Future Plan and Summary

This will be a challenging but fun implementation of a classic game. If we have extra time we may try to implement a computer player so that solo play is possible. If we are unable to implement the keyboard module we may be forced to use the onboard buttons but we hope not to. If we have even more time we may also implement sound effects for added fun!