ECE385 Final Project Proposal

Project Idea: Frogger

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April 6th, 2016

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I. Ideas and Overview

Our idea is to create a ”Frogger” game with the basic premise of moving a frog across the street without getting hit by any moving obstacles (refer to Figure 2 for more details). This will be accomplished via similar techniques used in lab8 and interfacing VGA graphics with a USB keyboard controller.

A NIOS-II Processor will be used which will be created in Qsys along with PIO modules to handle the input and output of the game. The sprite data and the background image data will be stored onboard the SDRAM which holds 1GBit of data (20MB) - this will be plenty enough to store the sprite data ($<$ 1MB) and any other background image data we choose to use. The color_mapper.sv file will then be modified to include the particular sprites wherever/whenever we may choose to use them.

II. Block Diagram

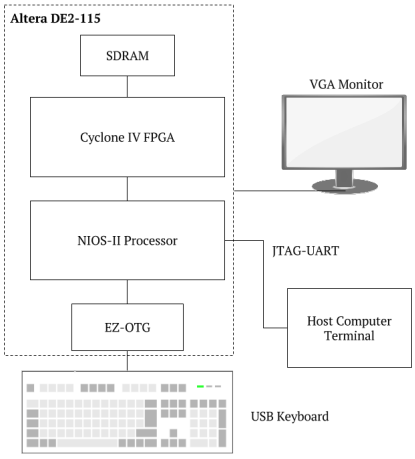

Fig. 1: Block Diagram

III. List of Features

Basic Functionality

- User controlled block moves according to grid set on VGA display
  - Up, down, left, or right depending on input
- Moving obstacles that are different shapes
  - Different types of objects can lead to different outcomes - i.e. object can either allow “frogger” to move with it or kill it.
- Multiple levels with increasing difficulty
- Starting point and ending point on any given level
- Timer
  - 5 minutes to complete level
- Color
  - Must be able to clearly differentiate between obstacle, user controlled block, and the map
- Score/Highscore

Optional Functionality and Complexity

- Multiple maps
  - Maps taking place with different shaped obstacles and different background
- Sound - 8-bit soundtrack
- Sprites and animations
- Start menu - Options Help Highscores, Start Button
- Powerups:
  - Slow-down/speed-up obstacles
  - Longer blocks for ”frogger” to hop onto
  -
- 2-Player Mode

IV. Expected Difficulty

The basic functionality of this game will not be much difficulty at all (4 pts). We are relying on

implementing a majority of our "Optional Functionality and Complexity" that will give us the bulk of the difficulty points. This project will most likely approach a 6 in terms of difficulty.

The basic functionality is not too difficult to implement and will require us to heavily modify Lab 8. Sprites, animations, different maps, levels and power-ups will all require efficient memory usage.

V. Proposed Timeline

The final design project will take a total of 5 weeks to complete. Establishing a timeline will help guide the project to completion. The table below gives an overview of lab dates and key checkpoints for the project.

Week #	Lab Date	Checkpoint
0	March 30	
1	April 6	Design Proposal Due
2	April 13	
3	April 20	Mid-checkpoint
4	April 27	
5	May 4	Final Demo/Report Due

A. Week 1 - Design Proposal Due

The design proposal is due in this lab period. A list of modules that will be implemented should begin to be organized by the team and a method of procedure for the project should be established.

B. Week 2

There is no lab this week. The tasks that should be completed by the end of this week include the following:

- create a generic block on screen to represent Frogger character
- generate grid for Frogger to move
- implement keyboard W-S-A-D to control up, down, left, and right movements for Frogger
- establish starting and ending locations on the map

C. Week 3 - Mid-checkpoint

This week will be the mid-checkpoint where progress in the project will be demonstrated to the TAs. The tasks that will be shown to the TA include all tasks scheduled to be completed in previous weeks as well as the following which will be completed in week 3:

- create generic blocks for obstacles (cars and logs)
- declare which obstacles Frogger can jump on and which obstacles kill Frogger
- make the obstacles move at various speeds and directions
- test and fix any bugs with object movement

D. Week 4

There is no lab this week. The tasks that should be completed by the end of this week include the following:

- add graphical design to Frogger and the obstacles
- input a background design
- add a second player with option for 1- or 2-player modes
- implement keyboard arrows to control up, down, left, and right movements for 2nd Frogger character

E. Week 5 - Final Demo/Report Due

The last week of the final design project is demo week where the project must be 100% complete and all deliverables ready to display for the TAs. The written report will also be due at this time. The remaining tasks that must be completed by the end of this week include the following:

- add a game clock and scoreboard
- construct a start menu
- add multiple levels with increased difficulty (optional)
- input powerups or other special features (optional)
- insert 8-bit soundtrack (optional)

VI. Figures

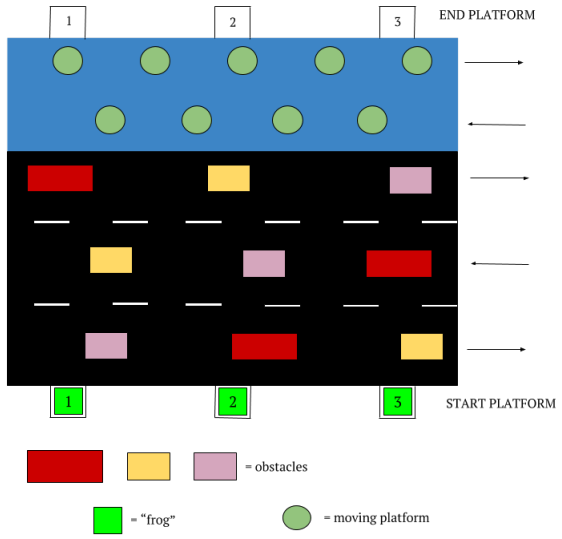

Fig. 2: Basic Gameplay Demonstration