ECE385

Fall2022

Lab 6

Final Project Proposal

Name: Xuanbo Jin & Ximo Wang

TA: Hongshuo Zhang

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1 Idea and Overview

We decided to implement a classic game **Metal Slug** in our final project. Like what we had done in lab6 and lab7, we need NIOS II CPU to interact with keyboard and this requires the use of C coding. Control logic will be based on the keycode read form MAX3421E, which is similar to controlling the motion of the ball in lab6.2. To draw the background and characters, we will need VRAM, color mapper and VGA controller implemented in SystemVerilog like before. To be specific, on-chip memory will be used as VRAM since the game needs relatively high refresh rate.

2 Block Diagram

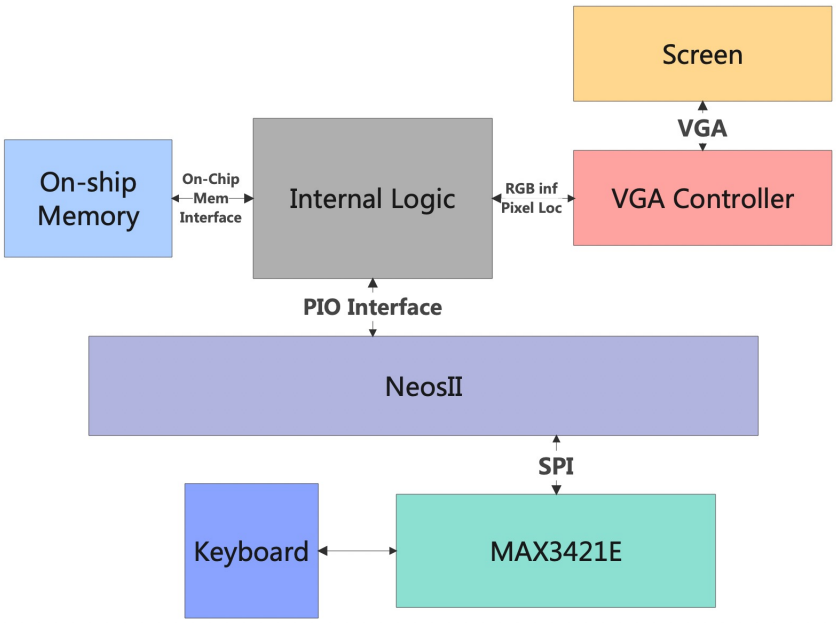

Figure 1: Block Diagram

3 List of Features

i. Baseline set of features for the project to be considered working

1. The basic motions of the characters including facing different directions, walking, jumping, shooting and melee attack.

2. Simple-minded enemies who can perform melee attack and be aware of the approaching of players.

3. Two player games allowed.

4. The scenario includes obstacles and steps.

5. Shifting to another scenario once the current mission is completed. Two or three in total.

6. A bar on the screen displaying HP, score and the bullet quantity. Some items may be displayed on the hex display instead, which should be decided during the progress.

ii. Additional features that may be implemented for extra difficulty

1. Grenade attack.

2. Special NPC may encounter to gain extra score, like a hostage waiting to be saved.

3. A final boss that may be smarter and stronger.

4 Expected Difficulty

According to the previous experience, our baseline project is in 6 to 7 level difficulty. Each if the movement of character is involved with several pictures just like animation. For example, when walking, there should be at least three actions in total, which are still,

left leg in the front, right leg in the front. The transition is not so easy to implement which is the basic difficult, about 4 to 5 points. The implementation of jump is much tricky. When jumping from high place, we have to figure out where the character should land and how fast he is falling. The action in the air like shooting or changing direction is even more complex. So the baseline difficulty is about 6.5 points. The grenade attack for extra difficulty involves with the valid range determination and corresponding animation of explode. As for the special NPC mission, the difficulty is mainly the animation. These two features may raise the difficulty to 8 points. If the final boss who can active attack with kind of wisdom, I believe the difficulty can reach 9 points.

5 Proposed Timeline

Nov.7	Proposal submission.
Nov.11	Character and background drawing, implementation of basic movement(without animation).
Nov.14	Implementation of shooting, jumping and walking, with animation.
Nov.18	Interact with enemy, continue working on the animation.
Nov.25	Shift between scnarios, two player control.
Nov.31	Polish former work, try extra difficulty features.
Dec.5	Whole project validation
Dec.9	Demo
Dec.14	Report submission

Figure 2: Proposed Timeline