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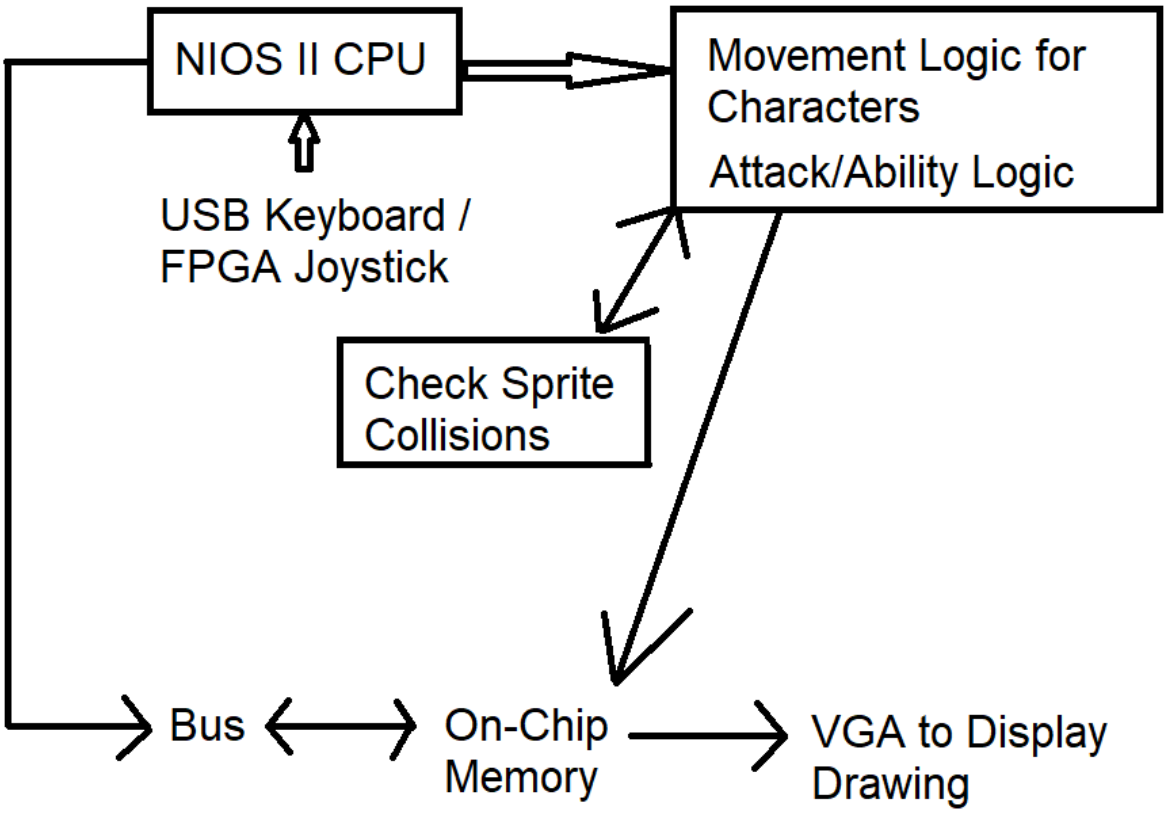
Final Project Proposal

Idea and Overview

We propose to design and implement an ECEB-themed parody of the Street Fighter II Arcade Game on our FPGA as a System-on-chip using the NIOS II CPU. Two players will use the USB keyboard to control their character's movements and attacks. An additional option of the FPGA joystick can be utilized for the character's movement. The hardware will control players' actions as well as hitbox detection. Software will determine what is displayed on the screen (background, sprites) as well as game mechanics. Mechanics includes factors such as the total score, health of each character, abilities, animations, sound effects, and music. An additional feature we wish to include is the choice of characters. Like the original game, we want to implement abilities specific to certain fighters. This means that a combination of hardware and software will be required to determine how the different abilities of each character interact with one another. We will display the game on screen using VGA signals.

Our goal is to demonstrate complete functionality of our game using the USB keyboard and VGA monitor, allowing two players to play the game simultaneously.

Block Diagram



List of Features

Features necessary to be considered working

- Displays colored output on the VGA monitor.
- The USB keyboard controls character movement and attacks.
- Characters take damage and interact with one another.
- Healthbar keeps track of Character health.
- Game keeps track of rounds won by each character.
- Game ends and declares a winner after a certain number of rounds.

Additional features that may be implemented for extra difficulty

- FPGA joystick compatibility
- Background music and sound effects
- Unique characters and abilities
- Sprite animations and alternating background maps

Expected Difficulty and Justification

The expected difficulty of our project with the necessary base features is 6/10 because we include several different technologies for our arcade game. Our screen will need to implement complex colored output of both static and dynamic sprites. Additionally, our game will take two-player input from the keyboard to allow for multiplayer combat. We believe the most difficult features of the base game will be utilizing software to allow characters in the game to interact with one another. This means detecting sprite collisions, keeping track of health, rounds, and the overall game score.

Implementation of the extra-features should add 1 difficulty point for each feature correctly implemented. We have paired features that require similar methods such as background music and sound effects. Full functionality of these extra features including sound, animations, and complex customization would increase the difficulty level to a 10/10, especially because we haven't experimented with sound or detailed animations in lab.

Proposed Timeline

Week 1:

- Implement USB, VGA, and FPGA communication
- Implement sprites and initial visuals of game

Week 2:

- Implement dual character actions using USB keyboard
- Implement interactions between characters and their abilities
- Implement health reduction and tracking for score keeping ← Not displayed on screen

Week 3:

- Display health bar, score, and background ← Base features completed
- Implement FPGA joystick compatibility

- Implement background music and sound effects

Week 4:

- Implement animations and different background maps
- Implement unique characters and abilities