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Group 5

CS M152A Final Lab Proposal

Overview

For our project, we will re-create the 2-player game Battleship, played on the FPGA board, and displayed in the UART console. The game will have two modes: one where each player must place their ships, and one where the players take turns attempting to sink the opposing player's ships. In the placement mode, buttons and switches will be used to move and rotate each of the five ships to each player's desired location. In the game mode, the four left switches will indicate the X-axis of the strike, and the four right switches will indicate the Y-axis of a strike. Buttons will be used to reset the game and send a strike. Two scoreboards will indicate how many ships the enemy has remaining. A player wins when all of the enemy's ships are destroyed.

Placement Mode

In this mode, players will set their 5 ships (1 5x1 ship, 1 4x1 ship, 2 3x1 ships, and 1 2x1 ship) at locations on their game board. By default, the buttons will be treated like arrows, (top button moves the current ship up, left moves it left, etc.) and the middle button will place the ship. The next ship will automatically begin getting placed after the player chooses the spot they want. After the first player finishes placing their ships, the second player will place all of theirs. While being placed, the ship will be horizontal if the rightmost switch is low and vertical if it is high.

While players are placing their ships, the position of the ships will constantly be checked to make sure that the current ship is not out of bounds. Every movement that the player makes while placing their ships will cause their updated game board to be printed to the UART console. Placed ships will be represented with a 'O' character, the current ship being placed will be represented with a '@' character, and overlapping placements will be represented with an 'X' character.

Game Mode

In this mode, players will take turns firing at locations on the game board. They will send instructions by encoding the x/y coordinates in binary, with the 4 leftmost switches representing the x-coordinate and the 4 rightmost switches representing the y-coordinate. They can then fire with the middle button. If they hit a ship, they will get another turn. They will be notified through the console if they've sunk that ship. The right button can be used to reset the game. At

the beginning of every turn, the state of the game board for the current player will be printed in the UART console, where hits are represented with ‘X’ and misses are represented with ‘#’.

Grading Rubric

Placement Functionality (50%)

- Movement Functionality - 15%
- Rotation Functionality - 15%
- Invalid Placement Checking - 10%
- UART Display - 5%
- Player’s Turn Functionality - 5%

Game Functionality (50%)

- Shooting Functionality - 20%
- Turn Switching Functionality - 10%
- Score Functionality - 5%
- Shooting Status - 5%
- UART Display - 5%
- Reset Functionality - 5%