

CS152A Creative lab proposal template

The proposal for the creative lab is flexible, but it should contain the following major components:

1. Design description

Describe the objective of the design. For example, if you are designing a game, clearly explain the rules. If you are designing a circuit for some specific tasks, be sure to clearly explain the task and how to control this special circuit. If your design is inspired by/based on some existing design or if you want to improve lab 1-3, clearly identify the similarity and difference between your version and the original version.

Also, clearly specify what components on the FPGA board you plan to use for input and output signals. Include any diagrams that can help with your explanation.

2. Design milestones and grading rubrics

Break down your design into modules or create several milestones. Give each module / milestone a score out of 100% based on its difficulty. This correctness breakdown will be used to grade your project when you demo, and we will assign partial credit to those who cannot finish the implementation.

Refer to the next pages for examples.

CS152A Final lab proposal

Student 1, ID: ID1

Student 2, ID: ID2

Overview

For our project, we will create a 2-player version of the game blackjack on the FPGA board. A switch will be used to alternate between displaying the player's hands (game mode) and the current score (score mode). Switches will also be used to manually reset the player's hands / current score.

Game Mode

The sum of the cards in each player's hand will be represented by 2 digits on the seven-segment display. Players are expected to alternate turns playing the dealer. The non-dealer player will press the hit button until he/she is content with his/her hand, and then presses the stay button. The dealer player will then hit until he/she beats the other player or busts. The player who wins will have their score incremented by one. The player's hands will then both reset back to 0, and a new round will begin.

If the player presses the hit button, then a random number from 2-11 will be added to the player's hand. If an 11 (representing the ace) was the new number picked to be added to the player's hand and would cause the player to go over 21, then a 1 is added instead. A player's hand is always represented as the highest possible legal value. An LED light will turn on signifying that an ace is in the players hand currently representing an 11 so that the player knows that the ace can also represent a 1 in the current hand. If the player would bust with an 11 ace in hand, then the ace is converted to a 1 when the player's hand is updated, and the light is turned off to signify that.

Score Mode

In this mode, the seven-segment display will show the amount of games that each player has won. This can be accessed by flipping the select switch to high.

Grading Rubric

Hit Functionality (20%) - When either player presses the hit button, a random number that represents a new card is added to their hand. As a result, the number on the seven segment display representing the player's hand will increment by 1-11.

Bust Functionality (10%) - When either player goes over 21, pressing either player's

hit button will have no effect as that signifies that the round is over.

Stay Functionality (15%) - When a player presses his/her stay button, a LED will light up signifying that the button has been pressed and pressing that player's hit button afterwards will have no effect.

Ace Functionality (10%) - When an ace is added to the player's hand, it will properly increment the player's hand number such that the player has the maximum hand value without busting. The ace LED will turn on if the hand is legal when the ace represents either 1 or 11.

Scoring Functionality (20%) - When both players have pressed the stay button with legal hands, the player with the higher hand will have their score incremented by one. When a player busts, the opposing player's score is incremented by one. In the event of a tie, neither player has their score incremented.

Score Mode Display (15%) - A switch will allow players to toggle between game mode (where the hands are shown on the seven segment display) and score mode (where the scores are shown on the seven segment display).

Reset Functionality (5%) - Switches will allow players to start another round or reset the score.