

## CS M152A Final Lab Proposal

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### Overview

For our project, we will create a replica of the classic arcade game *Stacker*. We will display the game on a computer monitor and take player input from buttons on the FPGA board.

### Game Description

The game board consists of a fifteen by seven grid of squares with blocks that move horizontally across the display. The game involves stacking rows of blocks successively on top of each other. If the player is able to stack groups of blocks to the top of the game board, they win.

### Game Mechanics

The player is able to stop the motion of these blocks and move to the placement of the next row of blocks by pressing a button. If the row that is stopped is only partially aligned with the row directly below it, any overhanging squares are eliminated and the next row be smaller. Moreover, if the stopped row is completely misaligned with the row below it, the player loses. The speed at which each group of blocks moves increases and the number of blocks in a group decreases as the player moves up the game board.

At the beginning of the game, there are three squares that move back and forth across the seven squares of the bottommost row of the board. If the player has maintained a 3-wide row by the fourth row from the bottom, the number of squares in a row decreases to two. Similarly, if the player has maintained a 2-wide row by the tenth row, the number of squares decreases to one.

### Grading Rubric

Outlined below are the goals for each portion of our project and their percentage contribution to the total project grade.

Basic Display (15%) - The game “starts” and displays the first blocks and the game board on the monitor as a static image.

Advanced Display (15%) - The game “starts” and is able to display the first group of *moving* blocks.

Simple Implementation (40%) - The game starts automatically on the board. The group of blocks is displayed and moves back and forth across the bottom of the board. The player is able to place blocks and move to the next row by pressing a button.

Reset Implementation (10%) - The player is able to reset the game at any point by pressing a button. The player will then restart their progress at the first row. Additionally, this button can be used to restart the game once the player has lost.

Lose Implementation (5%) - The player is able to lose by misaligning all of the blocks on a given row. Upon losing, the UI signal will signal to the player that they lost. The player is able to restart the game by pressing the reset button.

Speed Scaling (5%) - The speed of moving blocks increases as the player moves higher on the board. This will make the game more challenging and entertaining.

Win Functionality (5%) - The player is able to win by building a stack that reaches the top of the board. Upon winning, the UI will signal to the player that they won. The player is able to restart the game by pressing the reset button.

Block Scaling (5%) - The number of blocks initialized on each level decreases as the player moves up the board. Misalignment of one of these blocks will not result in the player losing and allow the player to continue with fewer blocks being initialized on successive levels.