PHYS 495 Term Project

Date: Wednesday, December 17^{th}, 2003
Due date: Friday, January 16^{th}, 2004

Instructions: Work should be submitted on or before due date. Submit your work both in electronic and printed formats to the teaching assitant.

Reading: Class notes, Java documentation, mathematics texts, whatever you need to efficiently implement the project.

1 Project: Button Madness

Your project (which is not per-person this semester) is the implementation of the game known as "Button Madness". Button madness is played using a four-by-four grid of buttons. Each button can be either red or green. At the beginning of the game, all buttons are set to green, and the user's goal is to turn all buttons to red. This is supposed to be done by pressing the buttons. When a button is pressed, the colors of exactly five buttons are toggled (i.e., green becomes red and red becomes green). The five buttons are the button that got pressed, and the buttons that are to the left, to the right, above, and below the button that got pressed. If the pressed button is at the edge, the target "wraps" to the other end of the field. Let us denote the positions of the buttons by (x, y) pairs, where x and y range from 1 to 4. Then, if button $(2, 2)$ (which not at any edge) is pressed, the buttons $(2, 2)$, $(2, 3)$, $(2, 1)$, $(1, 2)$, and $(3, 2)$ will be toggled. If button $(1, 2)$ was pressed (which is at the left edge), then the buttons $(1, 2)$, $(1, 3)$, $(1, 1)$, $(2, 2)$, and $(4, 2)$ will be toggled.

2 Requirements

The game must be implemented as a Java application (i.e., not an applet). The playing field consisting of 16 buttons must be implemented using a `Canvas`, and not `Buttons`. The game `Frame` must be resizable, and the components should react appropriately.

In addition to the playing field, the game should contain facilities to start a new game, and display the number of button presses in the current game. It should also contain a button to start a "randomized" game, where the colors of the buttons are assigned randomly rather than being all green at the start.

The game should obviously detect when all buttons have been turned red, and somehow display a message indicating that the player has won the game, and the number of button presses used.

The design of the game is up to you. You should try to make it look good, as well as function perfectly.

If you are feeling creative, you can make it possible to play the game with a larger grid size, which can be set by the user for bonus points.

Note that you are not allowed to cooperate in this project. You can discuss the project with your classmates, but you should be the one to write your code, and you should know what you are doing.