Lab 2: Silly Game

Worth 30 points (25 lab + 5 report) + 4 point extra credit.
Check offs will use the submitted source files and can happen the week after submitting

Administrative Issues:

- No partners allowed on this lab, it is to be done individually by each student, though feel free to discuss things at a high level.

Tutors/TA Review:

- Using the connector to make clean wire routing.
- Using the signal sender and signal receiver tools to do multiple pages.
- Demonstrate the "bitmap" tool and how it works by looking at the example schematic below.

Lab Objective:

In this second lab, you will be designing a simple Tic-Tac-Toe game. Here are the specifications:

- Start with the "tictactoe.lgi" example schematic. You should save this file to your local folder and use it as a starting template.
- Unzip the file "xo.zip" into the same directory; these are the graphics for your "X" and "O". Feel free to find and use your own graphics.
- Simulate the example design, noticing how the "0" is displayed when you turn the selector to 2, and an "X" is displayed when the selector is turned to 4.
- You may have to change the Bitmap properties and enter the file name, "XO0.bmp".
- Create a 3x3 matrix of these and design the logic to detect "X" or "O" winning the game.
- **Practice good layout skills** by being neat with your wiring and labeling.

This is a fairly easy game to build in logic; you are basically just AND'ing and OR'ing. The goal is to give you an idea how you can use basic logic to build simple functional units. Also, it will give you a feeling for how much logic it takes to "build" things.

Lab Requirements:

You must have the following in your lab:

- A neat and pleasing to the eye game board.
- Logic to detect a match in any row, column, or the 2 diagonals for both the "X" and "O" player.
- When a game is won light up an LED with a label for the winner, either "X" or "O. Thus 2 LEDs at a minimum are required.
- Use the "node" tool to route wires more neatly.

So, how do you win at Tic-Tac-Toe? You simply get three in a row, a column or a diagonal. Use the wires labeled “X” or “O” to do this (hint: AND together three in a row). If you get stuck you can ask the TA/Tutor for more hints.

Extra Credit:

Detect when it is a tie and add some sounds to the system, maybe when moves are made or someone wins/ties. New graphics. Be creative.

Schematic comment requirements:

 Please put minimal block comments at the top of your schematic including your name and UCSC email address. You should also include more information such as Due Date, Lab number (Lab2), lab title, and your section and TA/tutor.
 You should label every page/sheet of you design. Add in useful comments like how to play your game.

Lab write-up requirements:

In the lab write-up (worth 5 points), we will be looking for the following things. We do not break down the point values; instead, we will assess the lab report as a whole while looking for the following content in the report.

- Your name, email, ID, lab assignment, and section number.
- Discuss your design and how you went about developing it. Assume the reader does not have MML and cannot do it.
    - What is the lab problem? Describe it, assume the reader doesn’t know what the game is.
    - How did you solve it? You can include logic diagrams or logic equations.
    - How gates and transistors did you use? Could you have used less? How? Discussion any changes or revisions you made to your design while creating/drawing it.
- What did you learn from the lab? Draw some conclusions you came to from building a basic game using logic.

Collaboration: ***You are allowed to discuss this lab with other students on this lab but all the work must be your own.***

Files to Submit to eCommons:

- **Lab2.lgi**
- **Lab2_report.txt**
- **Any sound files you added or graphics files needed**

Check-off: You should demonstrate your lab when it is finished so the TA/tutor can check you off, you will still need to electronically submit your files.

Grading template (total points possible overall: 30 + 4 extra):

Sign off is worth at most 25 points:

- **A**: 22-25 points. Have a completely functional game that is fairly neatly laid out (more neat, more points)
- **B**: 20+ points. Has a game that works but is messy and /or poorly designed
- **C**: 17+ points. Game mostly works, has some functional issues or minor glitches

- **D**: 15+ points. Game is mostly done but doesn't work correctly or was turned in very late

Up to 4 points for extra credit; detecting a tie for +2, and +2 for sound effects for moves or win/tie, +1 using your own graphics so doing something else cool
Lab write up is worth up to 5 points.

Happy Designing!!