Fall 2003 – CSE 207 Digital Design Project #3

Background

Casino Systems Experimenter LLC did it again. They lost everything two weeks before the prototype was supposed to be delivered to Foxwoods. You have been hired as a consultant to fix the situation. According to the company, the prototype was going to be the hottest thing to hit the casino world – Tic-Tac-Toe. This popular game played on a 3x3 grid is played by two players, X and O. In turn, each player places a token on the game board attempting to create a row, column, or diagonal that contains three of their tokens. The player with the X token goes first and the game is over when either player wins or when the board is completely filled but no winner has been declared. Fortunately for you, the interface had been finalized weeks ago and was sent away for production. The piece lost was just the internal circuitry that played the game. The company building the physical prototype has agreed to send a copy of the design notes back so you have a complete understanding of the interface that you will have to design to. The management has provided the following requirements for functionality, usability, and look/feel.

Interface Requirements

The box being returned has a 3x3 ASCII display that will show the token placed in the grid at all times. Grid squares are addressed by their row/column location (00, 01, 02, 10, 11, 12, 20, 21, 22). When no token is present, the display will show an underscore '_' (0x5F) otherwise the characters 'X' (0x58) and 'O' (0x4F) will be used for player tokens. Next to each display is the momentary contact button that selects the current player's token into that game square. There is a momentary contact button (CLR) that will reset the game regardless of where the game is. Upon reset, all squares will be empty, no winner will be declared, it will be player X's turn. As each token is placed on the game grid, the system must automatically switch between each player. All switches have weak pull-ups on them. Upon closure of the switch, the signal is grounded. When a win is detected the game will stop responding to all buttons except reset. There are several LEDs to assist the user in determining whose turn is next and who, if anyone, has won. These lights must be turned on as appropriate.

Considerations

This problem has several possible solutions. Ultimately it does not matter which approach you select, provided the system requirements are met. If you have a question about the spec, please ask – and check the web page for updates as your colleagues catch problems with the requirements. The bottom of the page has the date that the document was last modified – make sure you are working from the most up-to-date spec.

Due Dates

October 22nd 2003: Functional Design – At this point, you should have a clear picture of all blocks and for the ones you are the least confident with, you should be working towards a schematic. Eliminate the "high risk" items first and then put the "easy" blocks together. Bring any materials you have to class so your TA can see your progress and answer questions if you have them.

October 29th, 2003: Project Due – For this project you are required to submit a SCHEMATIC AND TEST CASES ONLY for full credit. The circuit must be labeled well enough so that someone training in the art will be able to figure out what you did. Your test cases should cover several critical cases and you may want a short paragraph to explain why the test cases you selected are necessary and sufficient.
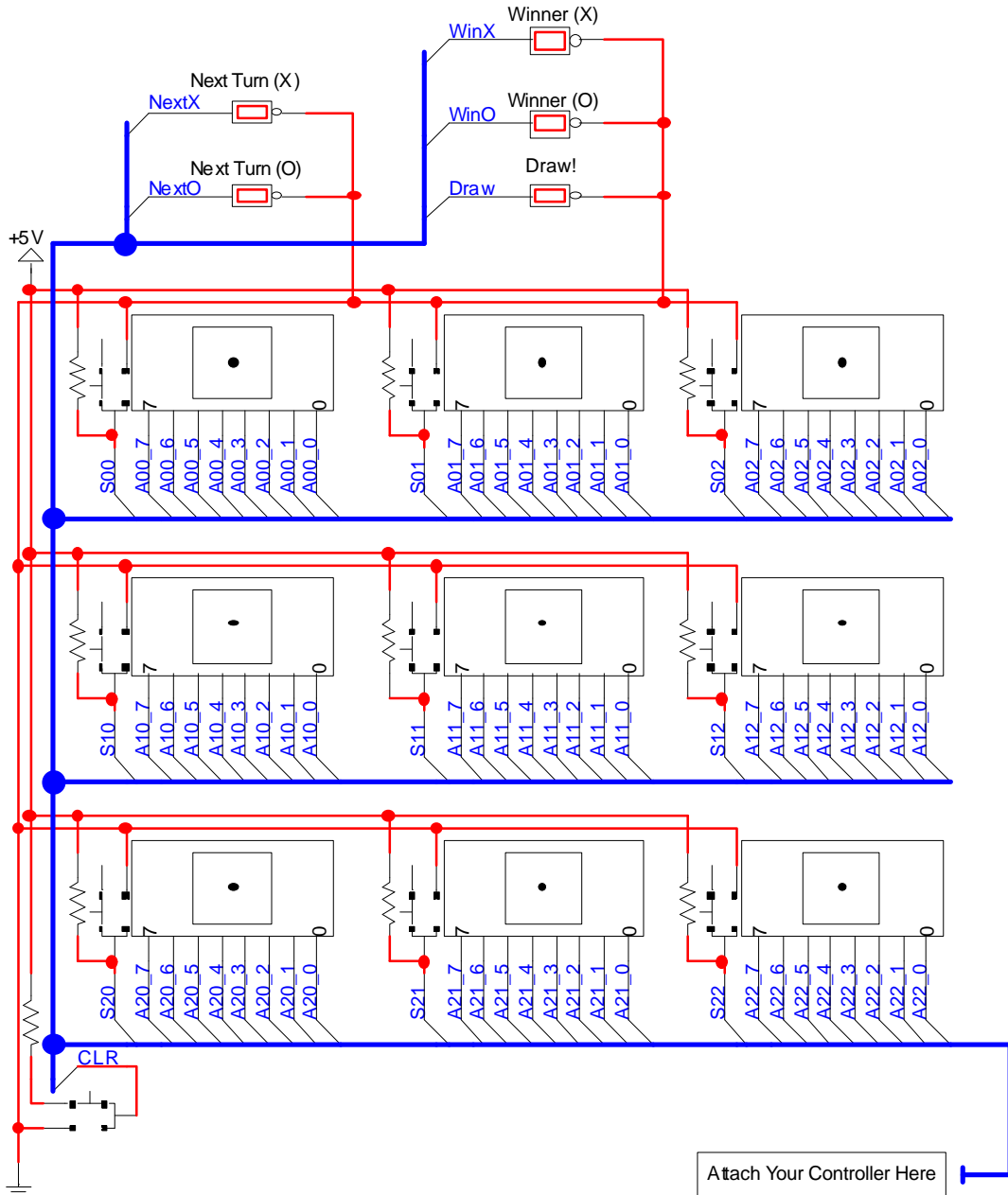
Download this interface schematic from the course web site
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