

BRAINWAVE '16 – ACUMEN

Back Benchers

So you're the generic Indian Engineering Back Bencher, who is terribly bored during lectures. You decide to do something about it, and build yourself a wireless game to play with your friend in the row behind you. The game is a classic, Tic Tac Toe. Your job is to make 2 consoles, one for you and one for your friend, which are able to wirelessly enable you to play the game and while away lectures!

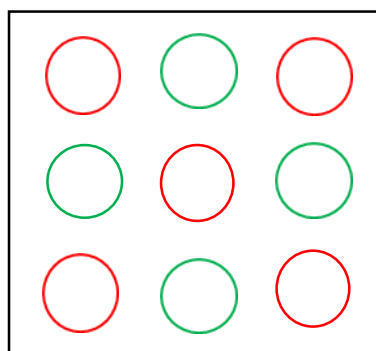
Task

As the Engineer, you are required to design and build the gaming system as per the following specifications –

1. There will be two hardware consoles. On turning on, each will automatically initialize to one of the symbols X or O. There will be 2 LEDs on the top right corner of each console; one Red and one Green. The console that is initialized to X symbol will turn on the Red LED, and the one with O will turn on the Green LED. These will remain turned on throughout the game, till the symbols interchange.



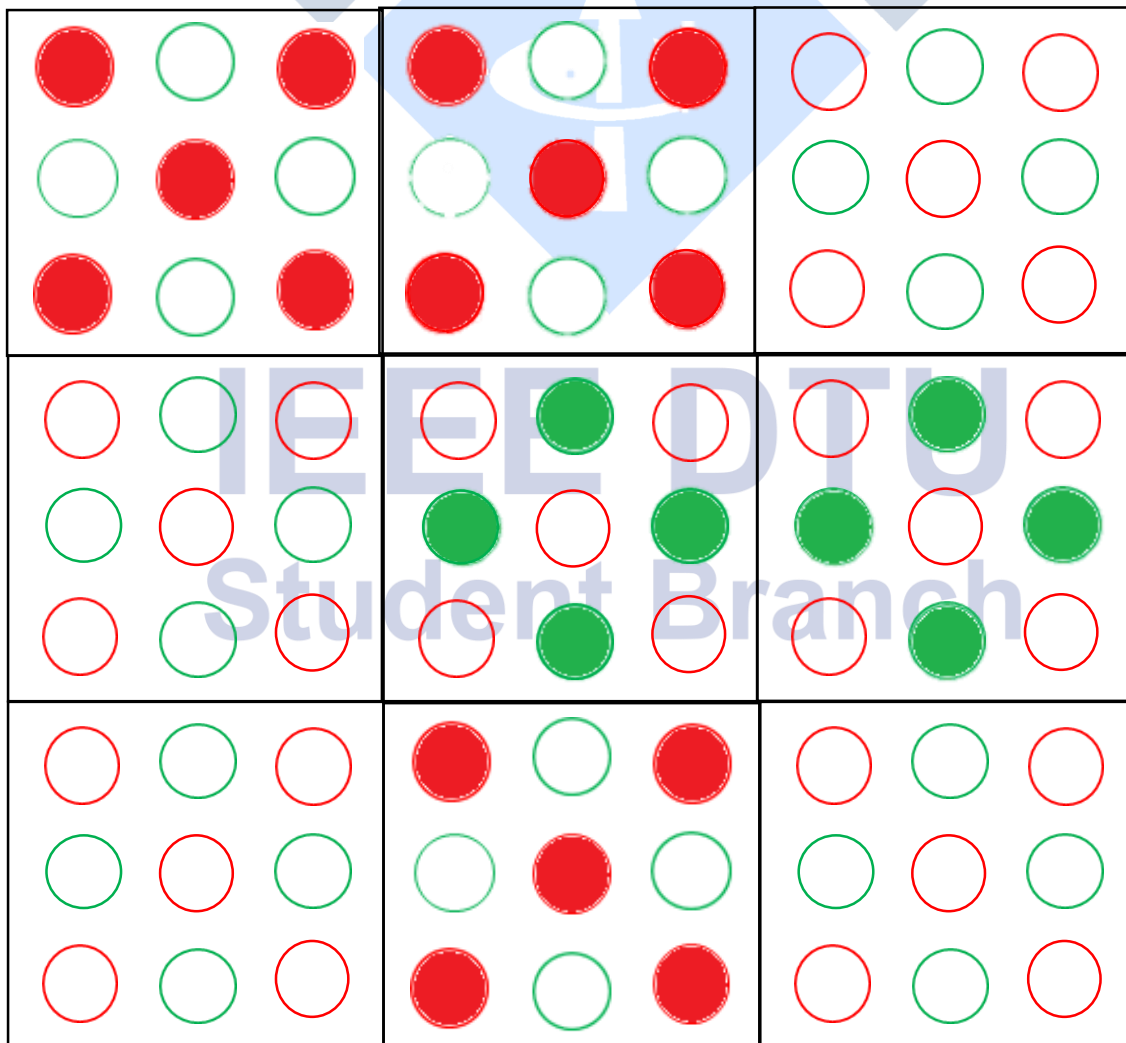
2. Each console will have a 3x3 grid, with **each square** having the configuration as shown.



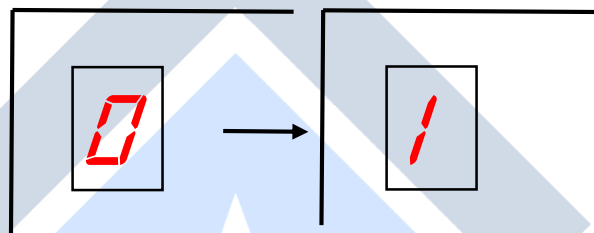
When an X is entered, the Red LEDs will glow in the corresponding square. They will form an 'X' formation as shown. Similarly, when an O is entered the Green LEDs will glow in the square.

- The message is communicated to the other console as to where the other player has placed his symbol. After the message has been communicated, the other console will also light up the square where the symbol has been placed. At every given point of the time, the displays on both the consoles will have to be exactly the same, except if the builder needs LEDs to light up while selecting the square. i.e., The entire 3x3 grid with the moves of both the players must always be displayed on both the players console.

Shown below is an example of what the displays of both consoles would look like after 5 moves. This should be the same on both consoles. The red Xs are by the X player, and the green Os are by the O player. *This is just one form of representation. Teams are free to display in any form as they may please. The colours and game are still strictly the same.*



4. After the message of the move has been communicated to the other console, and the display has changed accordingly, the consoles will individually evaluate the board situation, based on the Xs and Os, and their own symbol, X or O (Red or Green LED on top right corner). If a particular console wins, all the LEDs corresponding to the colour of the winning console must turn on on *both* consoles for three seconds, and the win counter must be incremented in the winning console only.
5. There is a 7-Segment Display on the top left corner of the console, on each console, that keeps track of the numbers of wins of that console. It shall be initialized to 0, and will be incremented for each win.



6. There is a good chance in a game like Tic Tac Toe that the game will be a draw. The two consoles must be independently be able to analyse the feasibility of a draw being the only result possible well before the entire grid has been filled. In case of such a state, the entire 81 LEDs must glow for a second, and both the counters of both consoles must be incremented. An example of such a state is shown below.

O	X	
X	O	
X	O	X

7. After each game, the symbols must interchange between consoles. For example, if during the first game, Console A played as X (Red), and Console B as O (Green), and assuming the result of that game to be anything, in the next game, Console A will play as O (Green), and Console B as X (Red).
8. This series of games will continue till someone reaches 9 points. Then, all the 81 LEDs of the winning console will glow for 5 seconds, and the entire series will reset.

9. Teams are free to use any form of **Wireless** communication protocol as they may please. There are bonus points for home-brew communication systems and for avoiding usage of pre-made modules and protocols in communication.

Judgement Criteria

1. The extent to which all the specifications of the entire robot have been implemented.
2. Range in meters upon time taken in seconds for one message to transfer.
3. Innovation. Home-brew modules and protocols will be highly appreciated.
4. Neatness and Compactness in the Hardware fabrication, and the Cost.
5. Finesse in coding and optimization, design of Display and Console, Ergonomics.

General Rules

1. Each team can have a maximum of four participants.
2. Teams may have members from different colleges and years as well.
3. Judges' decision will be final and binding.
4. Participation is open for all undergraduate and postgraduate students.
5. If any other material is required, the participants may ask for the same through e-mail or phone at least 10 days prior to the competition.

Competition Structure

Stage 1-

Each Team has to mail a soft copy of the synopsis by 30th January, 2016 to brainwave.troika@dcetech.com. The synopsis must contain the list of components used, circuit diagram and the algorithm applied.

Stage 2-

Teams registered in the first stage will appear on the competition day with their fully working model for the final show down. Team with highest marks and best performance will be selected as per marking criteria and judge's discretion.

Please regularly check the website for further updates on the competition and the change in rules and regulations, if any.

All the Best!

#HappyTroika ☺