TIC -TAC-TOE USING VGA OUTPUT

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Introduction

- Tic –Tac- Toe is a very simple game where two people can try to match 3 objects in a row vertically, diagonally, or horizontally. A Traditional game of Tic-tac-toe is played using X's and O's, but this game will be played using colors red and blue.

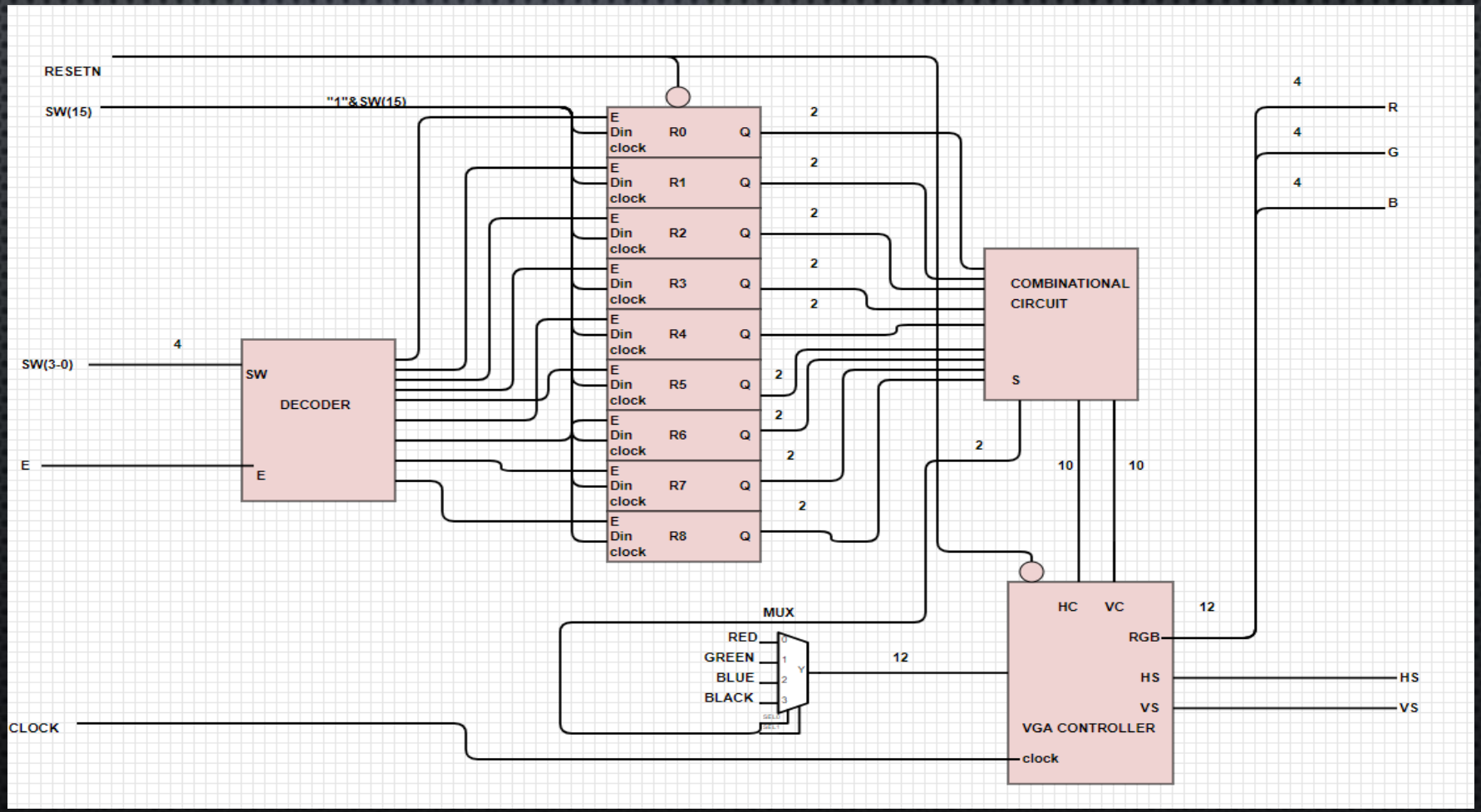
GAMEPLAY INSTRUCTIONS

- USING THE NEXYS 4DDR BOARD THE USER CAN SELECT WHICH SQUARE THEY WOULD LIKE TO PLACE THEIR COLOR IN BY USING SWITCHES 3 DOWN TO 0 TO CREATE THE BINARY REPRESENTATION FOR THE BOX THEY WOULD LIKE. THEY CAN ALSO SELECT WHICH COLOR THEY WANT BY USING SWITCH 15. TURNING SWITCH 15 ON SELECTS BLUE, AND TURNING IT OFF SELECTS RED. ONCE THEY HAVE SELECTED BOTH OF THESE THEY HAVE TO HIT THE CENTER BUTTON AND THEN THEIR COLOR AND POSITION WILL SHOW UP ON THE SCREEN. WHEN A GAME IS COMPLETED THE USERS CAN HIT THE RESET BUTTON TO START A NEW GAME.

0	1	2
3	4	5
6	7	8

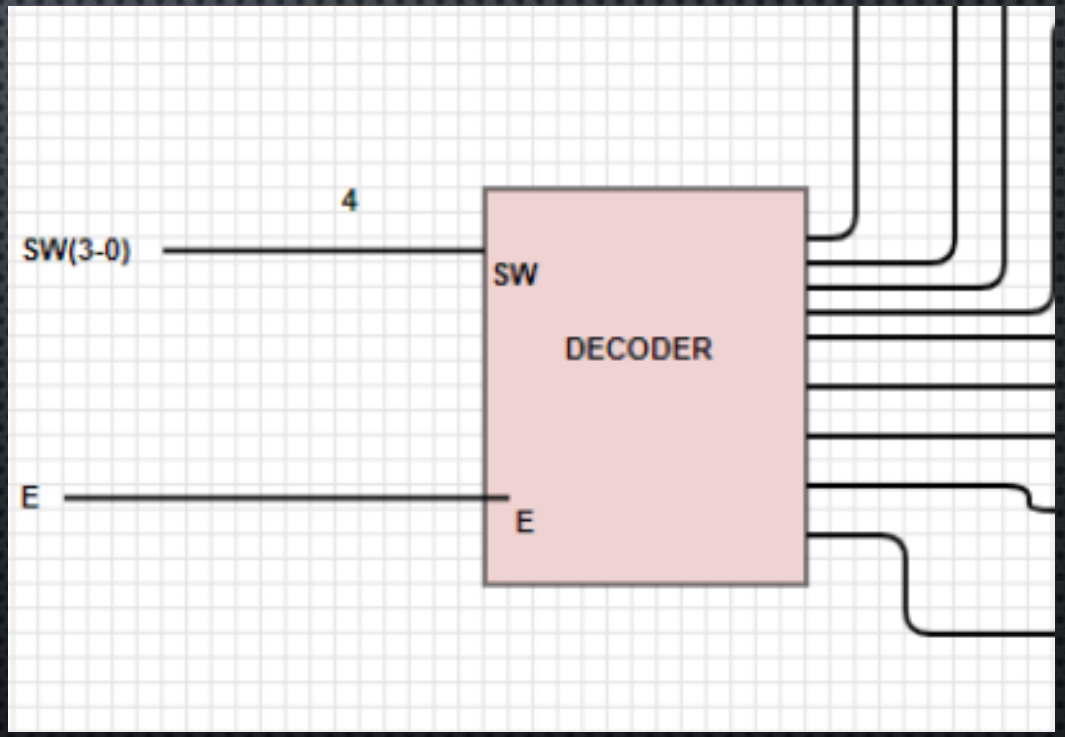
OVERALL DESIGN

- THE MAIN COMPONENTS USED IN THE OVERALL DESIGN ARE;
  - DECODER
  - REGISTERS
  - COMBINATIONAL CIRCUIT
  - MULTIPLEXOR
  - VGA CONTROLLER



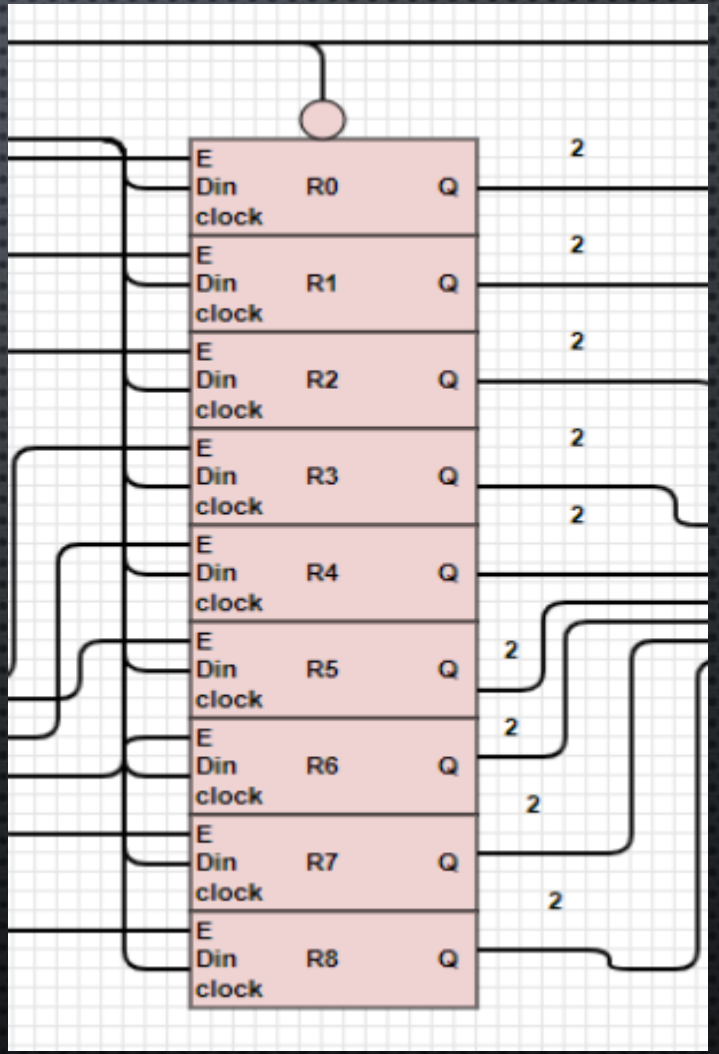
THE DECODER

- THE PURPOSE OF THE DECODER WAS TO ENABLE CERTAIN REGISTERS DEPENDING ON WHAT THE USER SELECTS FOR SWITCHES 3 DOWN TO 0. FOR EXAMPLE IF THE USER INPUTS "0000" THEN THE DECODER WILL ENABLE REGISTER 0.



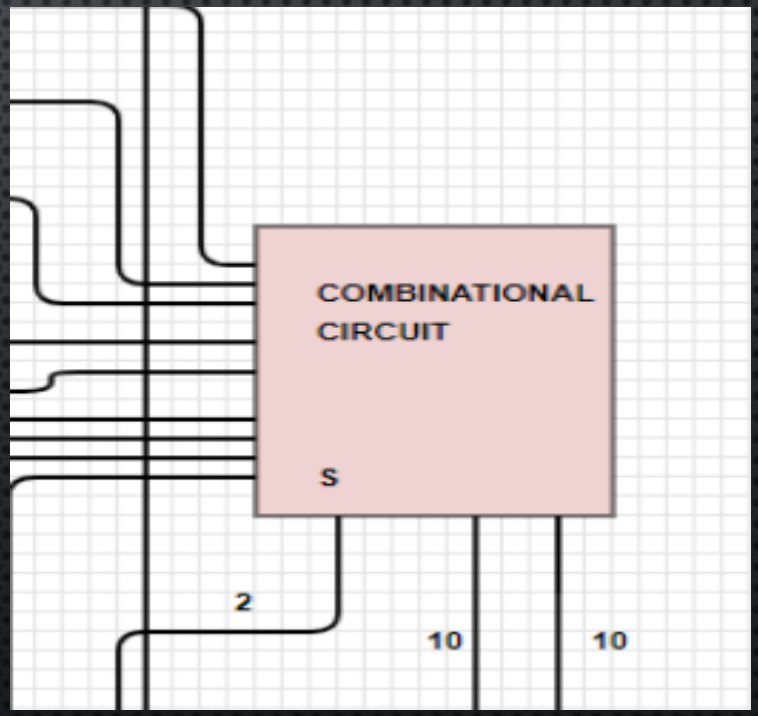
THE REGISTERS

- THE REGISTERS SERVE AS A MEMORY FOR THE COLOR INPUT BECAUSE THE USER DOESN'T WANT THEIR COLOR TO DISAPPEAR AFTER THEIR TURN IS OVER. THE REGISTERS ARE ENABLED BY THE DECODER, AND STORE A 1 CONCATENATED WITH THE INPUT FROM SWITCH 15. SWITCH 15 DICTATES WHAT COLOR IS STORED, AND THE PURPOSE OF THE 1 IS TO VALIDATE THAT THERE IS SOMETHING WRITTEN INTO THE REGISTER.



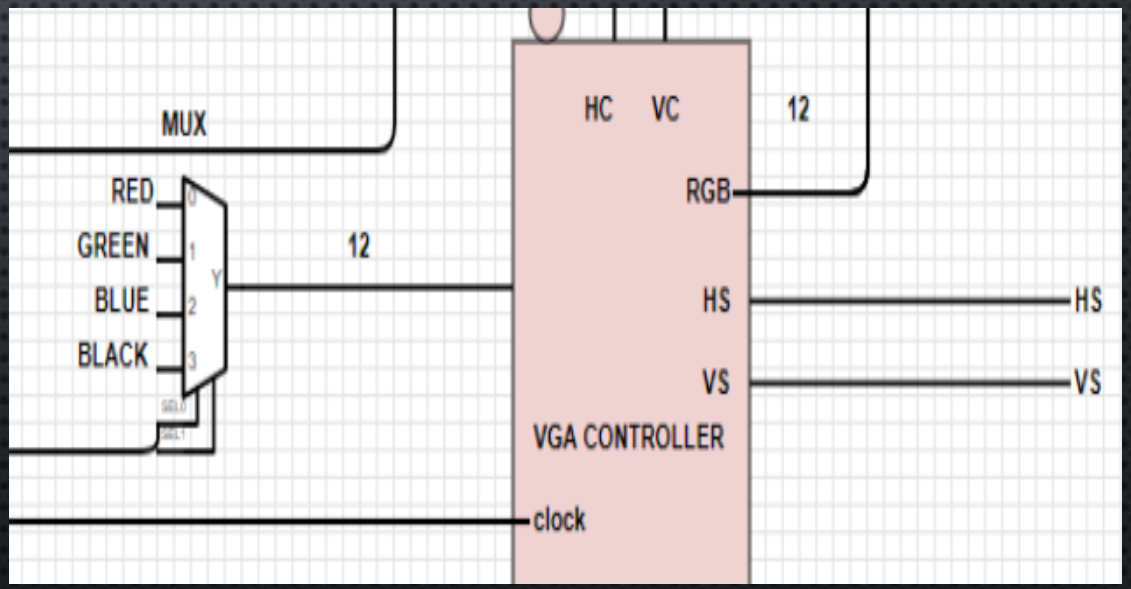
THE COMBINATIONAL CIRCUIT

- THE PURPOSE OF THE COMBINATIONAL CIRCUIT IS TO DECIDE WHICH REGISTER TO PULL OUT OF DEPENDING ON THE HCOUNT AND VCOUNT INPUTS FROM THE VGA CONTROLLER. BASED ON THESE HCOUNT AND VCOUNT VALUES AND THE DATA FROM THE REGISTERS, THE COMBINATIONAL CIRCUIT WILL OUTPUT A SELECT LINE FOR THE MULTIPLEXOR THAT WILL DECIDE THE COLOR THAT WILL BE DISPLAYED



THE MULTIPLEXOR AND VGA CONTROLLER

- THE MULTIPLEXOR AND VGA CONTROLLER GO HAND IN HAND, THE MULTIPLEXOR WILL SEND A 12 BIT COLOR SIGNAL TO THE VGA CONTROLLER DEPENDING ON ITS SELECT INPUT FROM THE COMBINATIONAL CIRCUIT. THE VGA CONTROLLER SENDS AN HCOUNT AND VCOUNT VALUE TO THE COMBINATIONAL CIRCUIT, AND DISPLAYS A COLOR ON THE SCREEN DEPENDING ON THE COLOR OUTPUTTED FROM THE MULTIPLEXOR.



Demonstration

- We will now demonstrate our design by playing a game of Tic-Tac-Toe.