Lab 2: FPFA-based Mental Binary Math Game User Manual

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Hardware Description

Each player is given a set of four switches that represent the bits of a hexadecimal number. By switching a switch to its active position, the players can indicate that a bit in their series of bits is active. Otherwise, the summation screen will show another number and the rightmost LED will be active and the leftmost will be inactive. Note: Summation is limited to four bits. See the image below for visual details. Players must confirm their entry by using their respective Load Button. The players must log by entering a password using the password entering button. The same button can be used to log off at the end of the game. Logging off will not alter the progress of the game. To reset, hit the reset button.
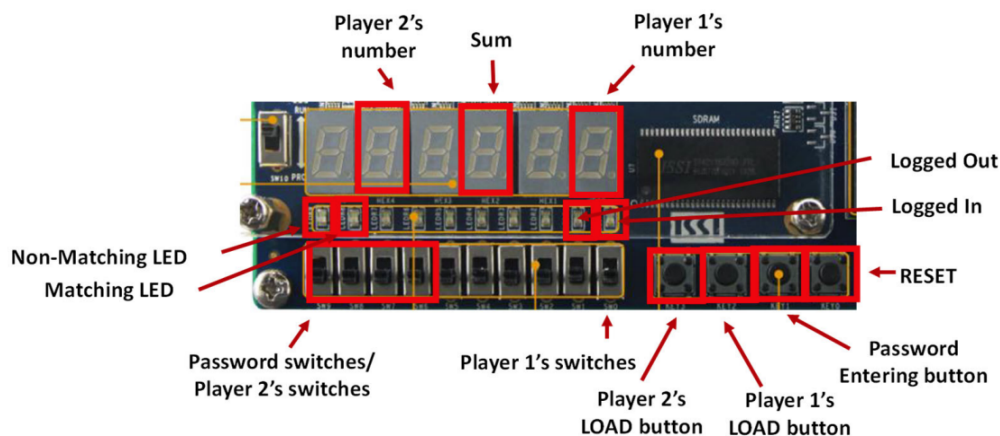
Game User Interface

How to Log-in

Use the 4 leftmost switches to enter the digits "0046" in order. Each digit entered must be confirmed using the Password Entering Button. If you get a digit wrong, you must start over. When you are successful, the Logged Out LED should turn off and the Logged In LED should turn on. Then you should have access to play the game. At any point, you may press the Password Entering Button to log-off and save your progress.

How to Play

1. This game is best played when each player is only allowed to move each switch one time per round.
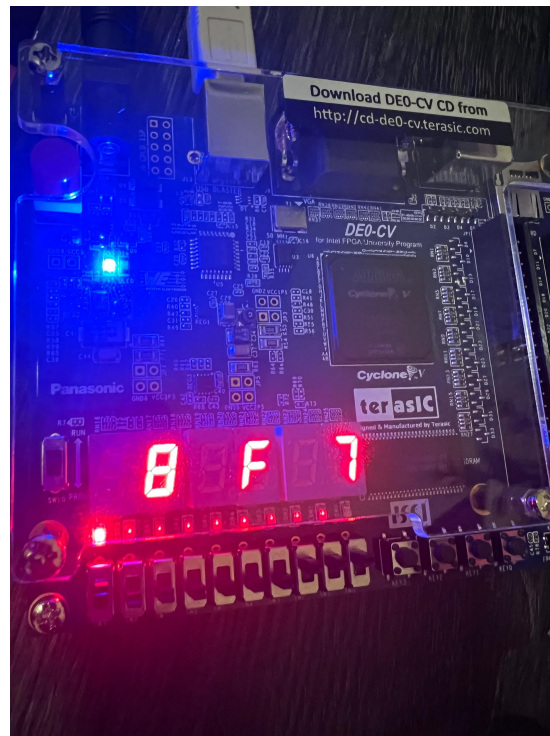
2. At the start of the round, Player 1 activates any number of their available switches to represent a four bit unsigned integer. As a result, Player 1's number will be represented in hexadecimal on the rightmost 7-Segment Display.
3. Player 2 then activates any number of their available switches to represent a four bit unsigned integer such that, when added to Player 1's number, the total is 15 or "F" in hexadecimal. The second 7-Segment Display will display the number that Player 2 generated.
4. The fourth 7-Segment Display will display the summation of the two numbers. If this display does not present the hexadecimal number "F" then Player 2 has lost this round. By default, the rightmost LED will remain on to signal that a correct answer was not given. If the display shows the number "F", Player 2 wins that round. The rightmost LED will deactivate and the leftmost LED will activate to signify a correct answer.
5. This is the end of the round. Players will switch sides of the board.
6. Repeat for as many rounds as desired.

Example Walkthrough 1: Failed Round

Turn	Player 1 Input	Player 2 Input	Player 1 Display	Player 2 Display	Summation Display	L/R LEDs
P1	0010		2			
P2		1000		8		
result	0010	1000	2	8	A	0/1

Non-Matching Case Demonstrated on FPGA

Example Walkthrough 1: Successful Round

Turn	Player 1 Input	Player 2 Input	Player 1 Display	Player 2 Display	Summation Display	L/R LEDs
P1	0111		7			
P2		1000		8		
result	0111	1000	7	8	F	1/0

Matching Case Demonstrated on FPGA