

MARKET AND USABILITY ANALYSIS

Usability and Ergonomics

The game itself is really intuitive and simple to understand and what makes it even better is the minimalism of the controls. The player only needs to interact with four buttons. All of these buttons are designed to be responsive, making the gameplay smooth and enjoyable. Additionally, the LED grid offers clear visual feedback, enhancing the player experience.

Suitability for the Goals

The system successfully meets the goal of creating a **fun and engaging** two-player game. The flashing animation upon winning adds a celebratory effect, further enhancing the enjoyment.

Resource Usage and Cost

The game implementation utilizes 775 ALUTs and 175 DLRs making the total resource utilization 930 ALUTS + DLRs after deducting the resource utilization of the clock divider.. This hardware design uses less than 1000 logic units making it potentially economical to use in other FPGAs. Additionally the LED display is lightweight requiring minimal engineering making the design even more resource effective.

Public Health, Safety, and Welfare Considerations

The game is safe for all ages and requires a level of intellect to win since it's not just simple tic-tac-toe. For younger individuals this may be an intriguing way of developing a more algorithmic way of going about games as they built their way up to chess.

Global, Cultural, Social, and Economic Factors

Connect 4 is a widely recognized game across different cultures, making it accessible and inclusive. The implementation on an FPGA provides a low-cost alternative for digital gaming in educational settings, demonstrating how embedded systems can be leveraged for both entertainment and learning.

Conclusion

Overall, the Connect 4 system on the DE1-SoC performs well, balancing usability, performance, and resource efficiency. It is an effective, engaging, and well-optimized design, showcasing the potential of FPGA-based gaming applications.