

Abstract

The project, titled "CPPONG," is an implementation of the classic Pong game on the Nexys A7-100T FPGA development board. The game features a graphical interface displayed through VGA, with a scoring system and lives counter. Additionally, the seven-segment displays showcase the ASCII conversion of keyboard inputs via PS2, providing real-time feedback. The LEDs on the board indicate the assigned keycodes for keyboard inputs, enhancing user interaction.

Control over the game extends beyond the keyboard, allowing manipulation through the board's buttons. The FPGA logic handles the game's state transitions, scoring mechanisms, and interface displays. Notably, the switches on the board are employed to adjust the music frequency and toggle the audio PWM output.

The implementation involves multiple modules, including a VGA controller, a text display unit, a graphics unit, and a timer unit. A finite state machine governs the game's states, such as "new game," "play," "new ball," and "game over." The logic ensures seamless gameplay, responsive scoring, and dynamic screen updates.

The project aligns with principles of digital design and FPGA programming, showcasing effective integration of hardware components for interactive game development. The combination of graphical and text-based outputs, coupled with diverse input methods, highlights the versatility of the Nexys A7-100T FPGA board for implementing interactive applications.
