Our group project delves into the realm of hardware-based gaming by implementing the classic Snake game on a Field-Programmable Gate Array (FPGA) platform. Leveraging the versatility of FPGA, we have integrated a myriad of interactive elements, including VGA for display, the onboard XADC for difficulty adjustment, 7-segment displays for score tracking, LEDs for dynamic visual feedback, and an array of switches and buttons for user input.

The FPGA serves as the backbone of our gaming system, executing complex algorithms to simulate the Snake game dynamics efficiently. The VGA interface facilitates a visually immersive gaming experience, projecting the game state onto a monitor in real-time. This is done through a hardware description language (HDL), specifically Verilog. With the understanding of how VGAs work and their essential components like horizontal and vertical syncs, the program maps out the screen however we desire. The VGA aspect provides a creative outlet as the customization of colors and designs are entirely open to us as long as we know how to express it mathematically.

To enhance user engagement, the 7-segment displays showcase the player's score, creating a seamless connection between the virtual and physical worlds. Utilizing the Nexys A7s onboard XADC, the user’s engagement is further supplemented by implementing a difficulty change input. Through this, the user is offered a pseudo version of a difficulty screen similar to selecting ‘easy’, ‘normal’, or ‘hard’ difficulty on screen like many other games nowadays. With the strict usage of Verilog and an FPGA, our project aims to remake this classic game and we believe we have achieved this.