**Design Specification**

**Operation of the game**

The game which we will design for lab 5 is a snake game. The game will start with a short snake moving on the LCD display (represented as a series of three white tiles). When the player moves the joystick up, down, left, or right, the snake will move in the corresponding direction starting at one end of the snake and the other tiles following. Apples will randomly spawn on the LCD display (represented as one red tile) one at a time. The snake can consume the apple by navigating to it with the joystick and gain points and an increase in length by one tile. While the snake is moving and consuming apples, an energy bar (represented with the LEDs) is filling. Once the energy bar is filled, the snake can use a power-up (move slower and double the score when eating an apple). This power-up will last until the energy bar depletes and starts the next cycle of filling. If the snake hits the edge of the display or itself the game ends. The player’s objective is to consume as many apples as possible without ending the game.

**Tasks in the system**

**LCD\_display:** This task is used to generate the animated graphs of the game on the LCD display. It will display the snake and apples on the LCD. This task also generates a graphical user interface for players to start the game, and it will show the end game results after the game.

**Snake:** This task is used to keep track of the position of the snake while it is moving, along with the length and speed of the snake that are affected according to the criteria in game operation. This task also detects if the snake hit the edge of the LCD display or itself to find out if the game ends.

**Apple:** This task is used to spawn apples in a random position on the LCD display one at a time. With the randomly generated position, the LCD\_display task can display the apple on the LCD display.

**Game\_Control:** This task is used to detect button pushes and joystick inputs for the snake movement.

**Energy:** This task is used to display the current energy the snake has with the LEDs to track how close the player is to a power-up. The LEDs will light up (start from the left-hand side) one by one to represent the energy gain.

**Selected Peripherals**

**INT0:** This button is used as the player option input. The player can use this button to select start game on the graphic user interface.

**Joystick:** This peripheral is used as the player directions input. Before the game, the player can use the joystick to select game options. During the game, the player can use the joystick to direct the movement of the snake.

**LED:** This peripheral is used as the display for the snake’s energy bar.

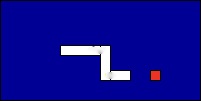


Figure 1. Sample Graphics of the Game on the LCD Display