# MSE 750 Real-time Control Systems

# Video Game Project

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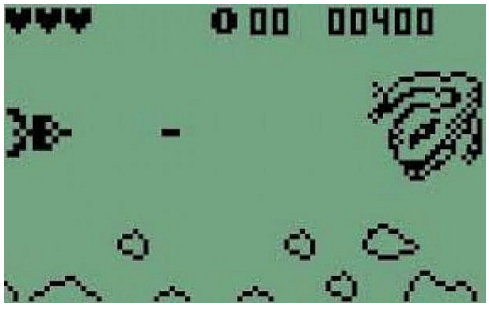
June 4, 2021

## Side Scroller Space Shooter Game

The goal of this project is to develop an embedded system able to host a side scroller space shooter game such as Space Impact or Gradius, as shown in Figure 1. In this game, the player should be able to freely control the movement of their spaceship and shoot lasers to destroy incoming enemy spaceships. The minimum hardware necessary to implement this game, in addition to the microcontroller, are: an LCD display; an analog joystick; and at least three buttons. Additionally, the screen should display player and game information such as health, score and elapsed time.

The target hardware will be composed of a Nokia 5110 LCD screen; one analog joystick; three push buttons; eight RGB LED (WS2812) displaced around the screen to create backlighting effects; and a piezo speaker to create simple sound effects. These features will be implemented according to the following planning.

- Release 1.0: Synchronous Serial Interface (SSI) to control the Nokia 5110 LCD screen; external interrupts to capture button presses; Analog-to-Digital Converter (ADC) to read analog joystick inputs; timer interrupts to handle game state updates; and UART to simulate/debug the game.
- Release 2.0: Synchronous Serial Interface (SSI) to control LED backlight effects; and Pulse Width Modulator (PWM) to drive a piezo speaker.




(a) Space Impact


(b) Gradius

Figure 1: Side Scroller Space Shooter Games