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ECE 153B
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ECE 153B Project Proposal – Space Invaders

Overview

A basic version of the popular arcade game “Space Invaders” will be implemented using the STM32L476RG microcontroller. In this game, swarms of enemy “invaders” move in from the top of the screen and slowly move towards the bottom. A player sprite exists at the bottom of the screen. A user can control a sprite in the game using a joystick and a button. The joystick will be used for left/right movement of the sprite. The button will allow the sprite to “fire” projectiles at enemies. If enemies are shot, they dissapear from the screen. The game ends when any enemies reach the bottom of the screen. After the game ends, the player’s high-score will be displayed, and the user will be asked to input their initials using the joystick. The player’s highscore can also be outputted to a connected computer terminal using the Termite program. The player can also choose to type their initials through the terminal instead. This data will then be stored on an external FRAM device. Additionally, a second button will be used to pause and resume the game.

Peripherals

- 128x64 OLED Graphic Display
- Joystick
- Push Button
- Non-Volatile FRAM
- Computer Terminal + Keyboard (Optional)

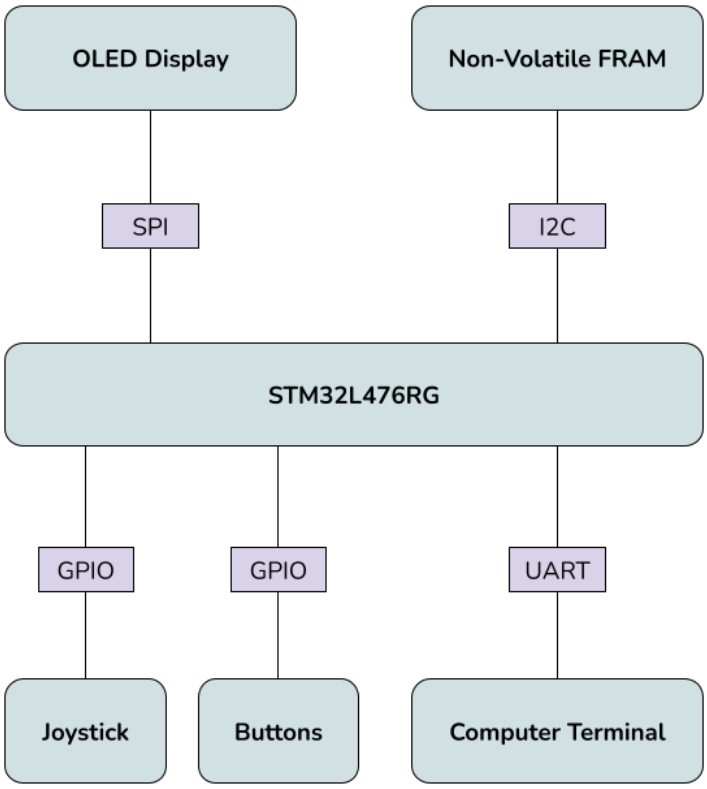
Serial Interface Protocols

- UART
- I^2C
- SPI

Software Structure

The logic used to run the game “Space Invaders” will be coded in C and run inside the STM32 microcontroller. A 2D matrix will be used to represent the position of the enemies in the game. A main loop will periodically move the enemies across and down the screen. User input will be detected using polling. Player movement speed and shooting speed should be independent of enemy movement speed. The joystick and button will be connected through two of the microntroller’s I/O ports. The “pause” button pauses the game using interrupts. The game will communicate with the OLED display using SPI protocols, and will store data in the FRAM using I^2C protocols. If a computer terminal is connected, the game will interact with the Termite program using UART protocols.

Block Diagram



Responsibilities

As this project consists of a single person, they will inherit responsibility for all parts of this project.

Project Site Link

https://github.com/nathanniu28/ece153b_final_project.git