

ELEC 3907 Group 2H

Project Proposal

February 1, 2026

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1 Project Overview

The goal of this project is to provide a compact arcade-style game console designed to restore hands-on interaction commonly found in traditional arcade systems. The console uses a 2D LED grid as the primary display as well as physical controls and audio. It is designed to run multiple classic games such as Tron, Battleship, and Snake using a multi-purpose hardware layout and modular software design.

2 Design

2.1 System-Level Description

The console is a game system where three different games can be played using a physical display and tactile controls. The console does not require an internet connection and can be played anywhere there is a source of power. It provides a compact, physical, and portable version of several arcade games such that people of all ages can enjoy using the simplistic controls and peripherals. Additionally, more games may be uploaded and included, allowing for different people with different preferences to enjoy the console.

2.1.1 The Hardware

The console itself (seen in fig. 1) consists of multiple subsystems, including a 16x16 LED display with a divider, where each of the 256 pixels of the display can be individually addressed to display an almost arbitrary number of colours. There are two LCD screens for game selection, acting as a menu for players to interface with the console. These LCD screens will also act as instructional screens to guide players through the games. There are two removable and adjustable controllers, where the controller can be plugged into either side of the console to accommodate right- or left-handedness or for single and multiplayer options. The speaker provides sound effects for audio feedback and soundscapes during gameplay. There is also a freestanding divider that will be used during games that require the players to not see each others' boards during gameplay—which is the case in battleship, for example. The microcontroller is programmed with the games, interfacing with the other components to provide a seamless experience while using the console. Finally, the power supply, powering the display and the microcontroller, which subsequently powers the other components.

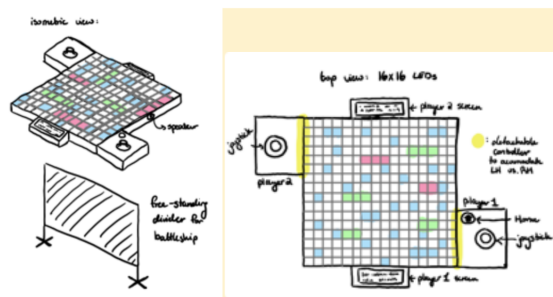


Figure 1: Orthographic views of the hardware design

2.1.2 The Software

The software system must be able to interface with all the components outlined, taking input from the controllers, controlling the LED matrix, using the LCD displays to relay information to each player, and playing audio. The system is constrained by the memory limitations of each microcontroller, as well as their single-threadedness. To overcome scheduling issues, especially with continuous-delivery applications like audio playback, a second microcontroller will be dedicated to receiving playback signals from the main microcontroller and controlling the speaker continuously.

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