ECE 411
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Team 5 Product Design Specification (PDS)

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Project Name

Word-n-Seek Game

Executive Summary with Concept of Operations

The Word-n-Seek design integrates a Wordle-style game into a small-sized arcade style gaming console, using a word retrieved from a Wordle-like API. This approach adds a unique dimension to the gameplay experience compared to using a phone or website.

The gameplay operates similarly to the popular Wordle game. Every day, the device will pull a five-letter word from the API. The user has six attempts to guess the word, selecting letters with a joystick and confirming choices with selection keys. After each guess, the game marks correctly placed letters and removes incorrect letters. The user continues guessing until either (a) they correctly guess the word or (b) they use all six attempts.

Part of the screen will display a simplified “Wordle grid” with six rows (one per guess) and five columns (one per letter). The grid will use red, green, and blue to indicate incorrect, correct, and unguessed letters, respectively.

Market Analysis

The target customers for this product are casual gamers, word puzzle enthusiasts, and fans of Wordle who are seeking a console version they can use at their desk. Competition will come from smartphone apps, websites offering similar word puzzle games, and multi-purpose portable gaming consoles. This product distinguishes itself by offering a focused and immersive gaming experience through a physical device dedicated solely to playing Wordle. The novelty of a desktop game version of Wordle will appeal to both collectors and a casual audience much like similar tabletop arcade cabinets. Priced between $50 and $85, it remains affordable while incorporating essential components such as a screen, controllers, and Wi-Fi / Bluetooth modules. This makes it accessible to a wide audience while delivering a unique and enjoyable experience.

Requirements

- Must display words to the user.
- Must allow the user to add and delete letters.
- Must generate a new word to guess every day.
- Must have two forms of input.
- Must be able to turn on / off the device.
- Must not overheat on failure.
- Should have arrow keys.
- Should have multiple buttons.
- Should run off a 12V 2A DC supply.
- Should provide internal regulation to 5V 2A DC.
- Should have a timed mode.
- Should be able to broadcast the website for the user to configure Wi-Fi connection.
- May be portable, i.e., work as a desktop or handheld device.
- May shock the user on failure.
- May have a console box made of cedar, for the smell and aesthetics, or poplar, depending on expense.
- May have other game modes other than Wordle.
- May operate off battery power.
- May have a sleep mode.
- May have light-up buttons.
- May give audible feedback in the form of tones / buzzes.

System Architecture

L0 Diagram:

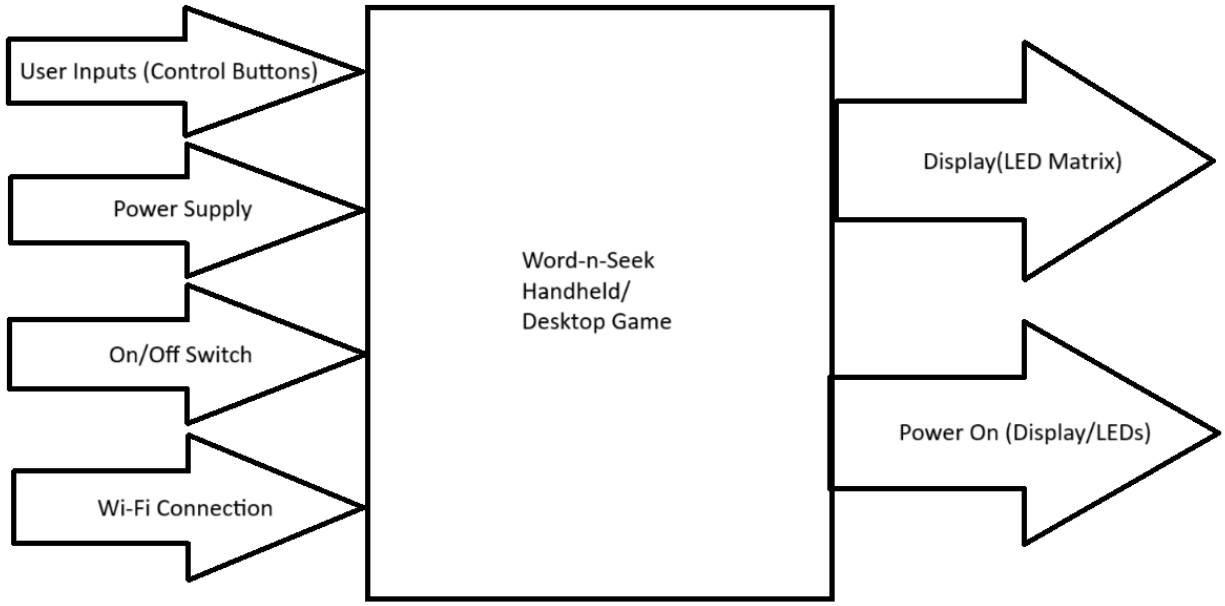

Figure 1. L0 Diagram.

L1 Diagram:

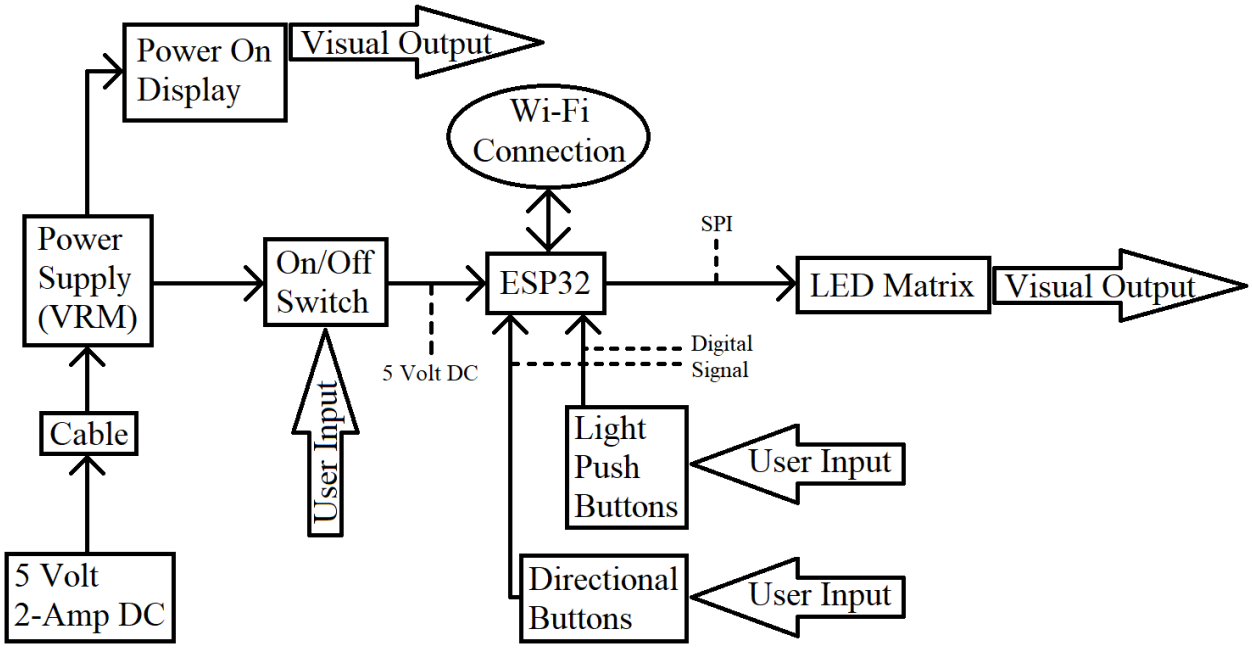

Figure 2. L1 Diagram.

Design Specification

Processor:

- ESP32-S3

Sensors:

- Arcade buttons
- Simple 4-way arrow key buttons
    - No particular brand, there are a ton on Amazon.

Actuator:

- 10x EC Buying 8x8 LED matrix displays
    - This particular display is driven by the max7219 chip and allows for easy daisy chaining of display modules. An LED matrix was chosen over an LCD panel due to time constraints and the available bandwidth of our team's coders. An LED matrix is easier to design graphics for than an LCD.

Power:

- 12V 2A DC regulated to 5V 2A DC

Development Environment:

- ESP-IDF framework

Enclosure:

- Wood or 3D-printed plastic case