

Project Proposal

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Website:

<https://sites.google.com/view/twooplayerarcade/home>

Overview

We propose to make an arcade system that allows two players to play games against each other. Initially, the players communicate with an interface on Termite which prompts them to choose which game to play, either a Pattern Memory Game or Battleships. After choosing the game, the players can then use their own Wii Nunchucks to control their actions in the game. Each players' game board will be represented using an 8x8 LED Matrix. In the memory game, players will be shown the same pattern and their goal is to use the nunchuck to attempt to follow the pattern. After several rounds, a final score will be updated to Termite and will indicate which player has won. In battleships, players can initially place their ships at whichever location on the LED matrix and will proceed to use the nunchuck to decide which position to shoot each other's ships. Upon shooting, Termite will indicate whether a ship was hit or not. Once all of one players ships are hit, the winner will be indicated on Termite.

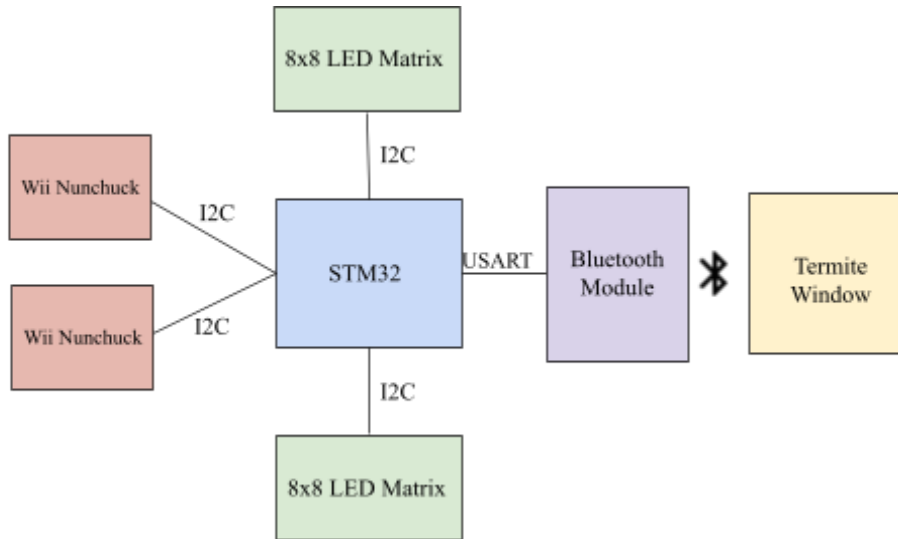
Peripherals

We intend to use two main peripherals, an 8x8 LED matrix and a Wii Nunchuck. Each player will have their own LED matrix to represent their game boards and they will use the Wii Nunchuck joystick to control their moves in the games.

Serial Interface Protocols

To interface with the peripherals we will use USART to interface Termite with the Bluetooth module and the STM32. We will also use I2C for the nunchuck connection and 8x8 LED matrix connection.

Block Diagram



Responsibility List

For our team, we intend to operate together to work on building and connecting the hardware components together. Sahil will place more emphasis on the hardware connection portion of the project. Rutvik will place more emphasis on ensuring the connections are correct in the hardware encoding on the software side. Both members will work together in software for the algorithm for the memorization and battleships games.

Software Structure

An 8x8 LED matrix requires the following pin assignments: a clock pin, input pin, output pin, and a load pin (all of which are supplied with GPIO pins and a clock source). The nunchuck interfaces with the microcontroller via I2C.

The Pattern Memory Game is represented in software with an 8x8 grid. During iteration, an arrow is instantiated in one of four directions: up, down, left, and right. A growing sequence of arrows are displayed that the user must then replicate. During the user response phase, the user will input directions via the nunchuck, which will trigger interrupts that compare whether the user is correctly recalling the sequence of arrows. The player that makes a mistake first will trigger an interrupt that ends the game and assigns the other player as the winner.

Battleship is also represented in software with an 8x8 grid. Each half of the 8x8 of the grid is assigned to a player. The halves are randomly populated with ships spanning varying units on the grid. Each player can only see their half of the board on their LED matrix. The players can traverse the board with the nunchuck (inputs handled via interrupts). A green LED indicates the location of the player's "cursor". A player can select locations on the opposing half with their cursor in order to "attack". The game concludes when a side's ships are all sunk.