

ECE 385

Spring 2024

Final Project Proposal

Gomoku Game

Ziheng Li (zihengl5)

Xin Yang (xiny9)

Section AL1

Prof. Zuofu Chen

Idea and Overview

The proposed project is to implement the classic game of Gomoku (also known as Five in a Row) on a Spartan 7 FPGA with additional AI functionality. The game's mechanics will mirror the traditional Gomoku game, where the objective is to have five consecutive chess on a board, either horizontally, vertically, or diagonally. Our game will utilize VGA drawing, keyboard input and both on chip®ister memory. The project will leverage the hardware capabilities of the Spartan 7 FPGA and C code to create an interactive and responsive gaming experience.

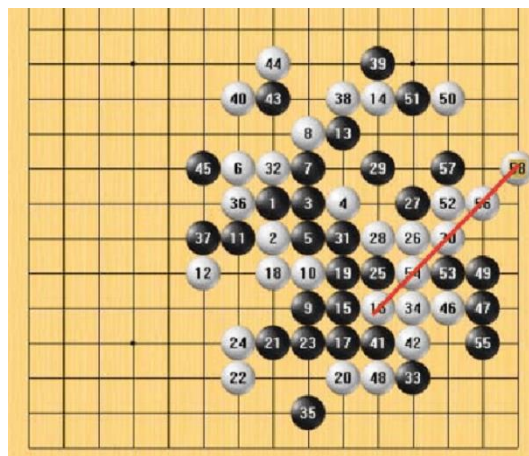


Fig.1 Sample Gomoku game

Block Diagram

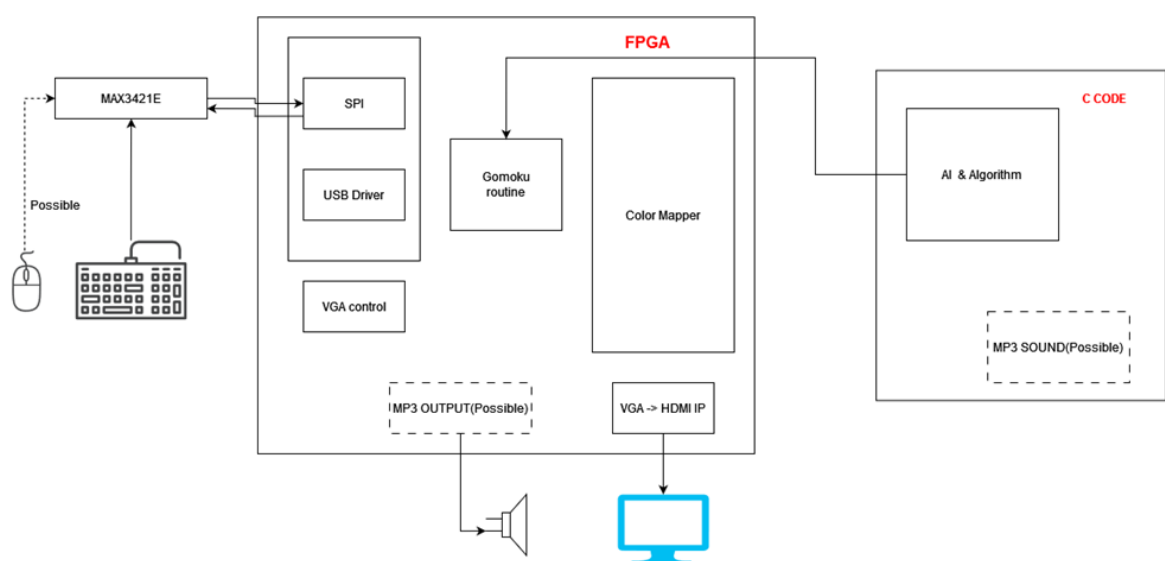


Fig.2 Block diagram of Gomoku

List of Features

USB Keyboard Input:

Players will use a USB keyboard to interact with the game to select the grid location to place their chess piece. **Potentially support mouse if we have enough time.*

Two Modes of Play:

Human vs. Human: Allows two players to compete against each other on the same device.

Human vs. AI: A single player mode where the player competes against an artificial intelligence. The AI will use some sort of algorithm that guarantee it will be super good/never lose.

Sound Effects (Time Permitting):

If the project timeline allows, additional features like background music and sound effects for chess placement will be add to enhance the gaming experience.

Expected Difficulty and Justification

The base implementation of the Gomoku game should be considered as 2/10 difficulty. The integration of AI presents a significant challenge, adding another 2 points to the difficulty scale. Including sound effects and background music would further increase the complexity, potentially raising the total difficulty rating to 5/10. Without the sound integration, the project stands at a 4/10 difficulty.

Proposed Timeline

April 8-14: Development of the basic board display and user interface.

April 14-19: Implementation of the Human vs. Human functionality.

April 19-26: Integration of the AI mode.

April 26-May 3: Debugging and final adjustments.

May 3: Demo.