Proposal – SE 101 Lab Project

Objective

Build a machine that can play the board game connect 4 with users.

Major Software Components

- **Implementation of LCD User Interface**

  As the LCD takes the major task to interact with users and to display the details of the game as much as possible, the UI of LCD is necessary for the implementation of software components.

- **Chess AI**

  In order to enhance the fun part of this game and intenseness of the competition, a chess AI is included to help the program to make a better decision. Due to the limitation of the hardware, the algorithm will basically applies minimax algorithm to recursively evaluate every move that the program possibly makes.

Prototype

1. Write an AI program using the minimax algorithm to determine best moves.
2. Optimize the algorithm by adding a heuristic function.
3. Use the Arduino Uno board to control a LCD board to display the chess board, interact with users and “play” the game with users.

Hardware

- 1 Arduino Uno main board
- 1 LCD board

Challenges

The challenges of achieving the goal of this project are drawing and refreshing the chess board (a 7x7 board), other objects (including texts) on the LCD screen, and modifying and optimizing the algorithm of the chess AI.

Although purely controlling the LCD is simple through specific external libraries, systematically integrating those basic procedures to implement specific operations (for example, updating the board after every move, freezing the screen and display the results, some basic UI for selecting options, positions of the move, etc) is more challenging during the development.

Since the possibilities of the game increases exponentially relative to the size of the board, therefore the optimization of the algorithm of chess AI is necessary so that the program is able to make a relative good move within a short period of time.