CS/EE 120B

Custom Project: Pong

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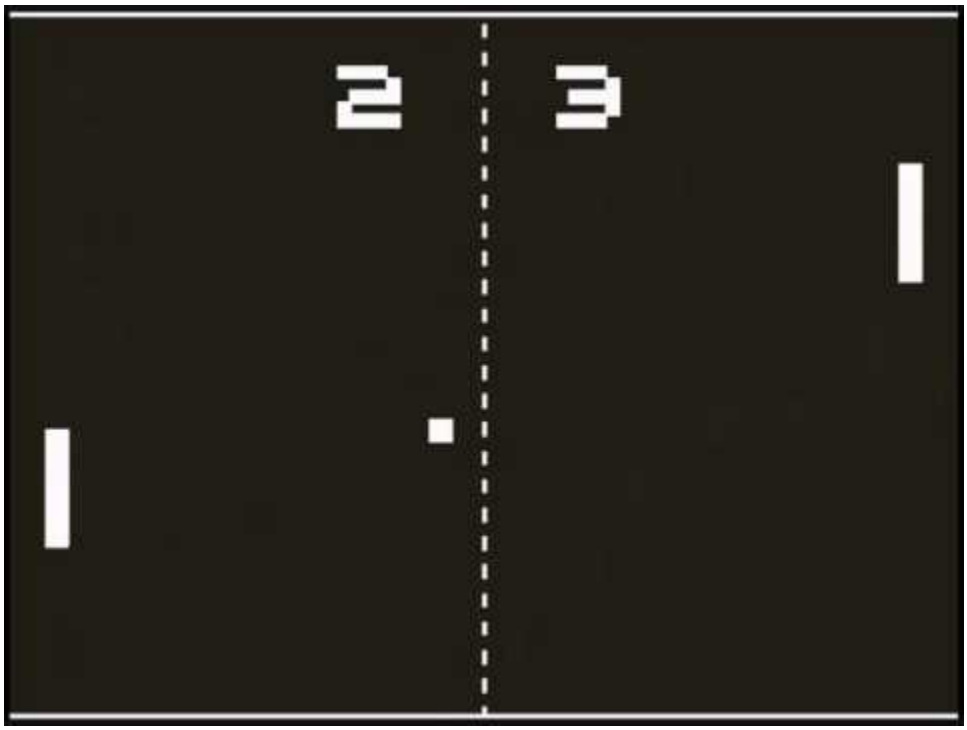
Introduction

Pong is a two-dimensional game that simulates ping pong. The player controls a paddle in the game by moving it along an edge or the screen, and can compete with another player or a computer controlling a paddle on the opposite edge. The ball is hit back and forth with the two paddles. The aim is for each player to reach 3 points before the opponents, which is gained when the opponent fails to return the ball.



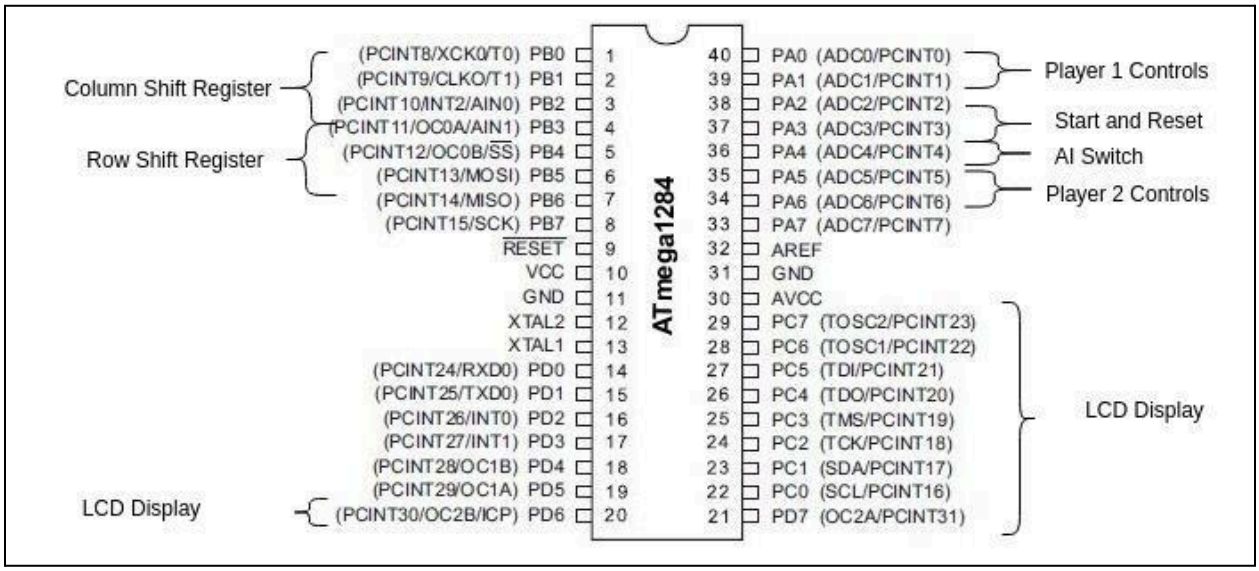
User Guide

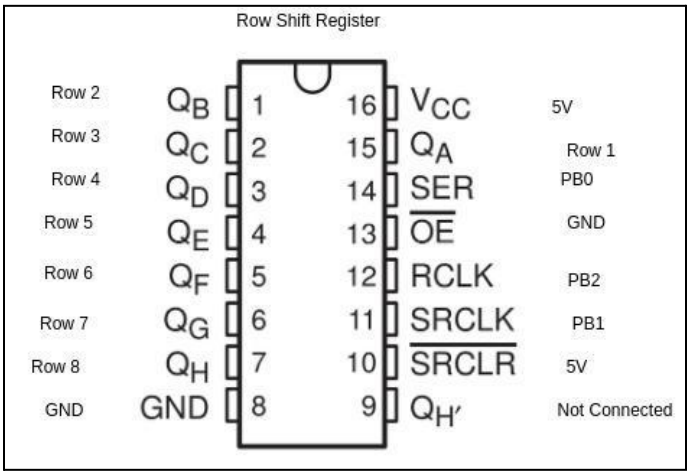
There are two buttons for each of the players that will move the players paddle on each of their respective sides. The start button will start a game. The game is won when one of the players reach 3 points and will display on the lcd screen who won. The lcd screen will also display the points scored by each player as the game continues. At the beginning of a game, the player can choose to play one player mode or two player mode with the AISwitch. Once a mode is selected

and a game has started, the game will remain in that mode until one of the players win or the reset button is pressed. Pressing the reset button, resets the game score and waits for a new game to start.

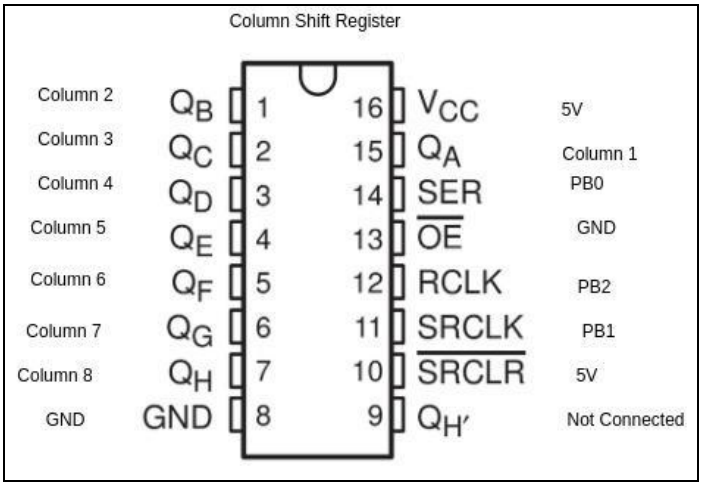
Hardware Components (Pin-out)

- **Inputs**
  - Control Buttons
  - AI Switch
  - Reset and Start Buttons
- **Outputs**
  - LED Matrix with Shift Registers
  - LCD Display

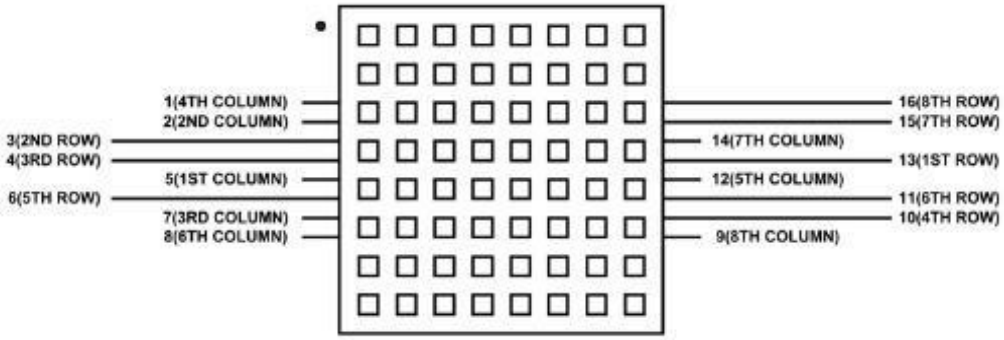




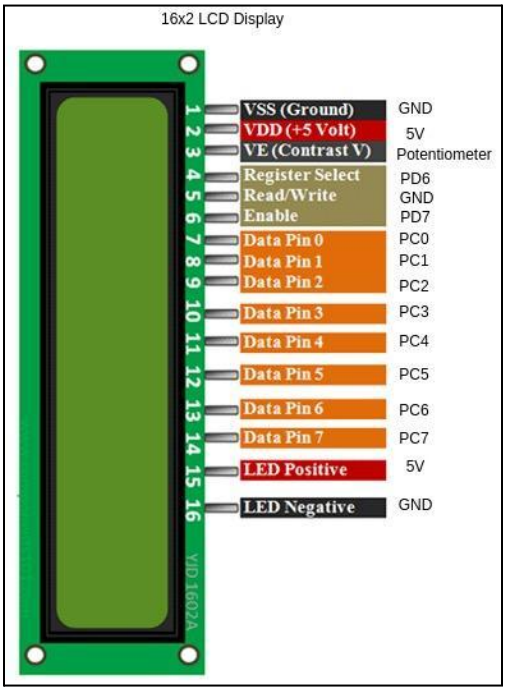
Column Shift Register



8x8 Red Led Matirx

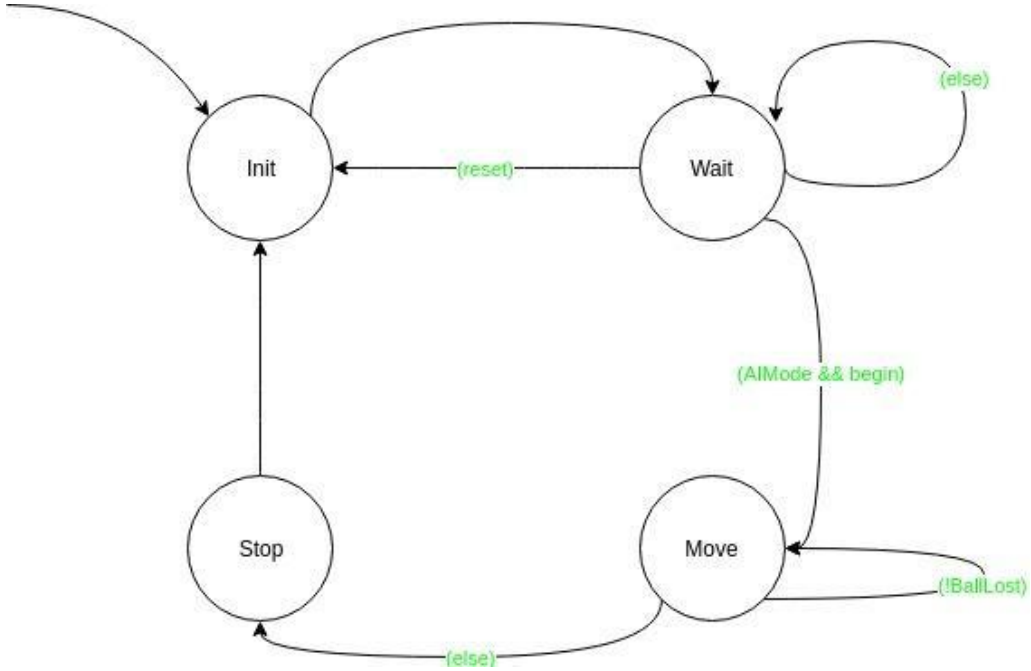


16x2 LCD Display

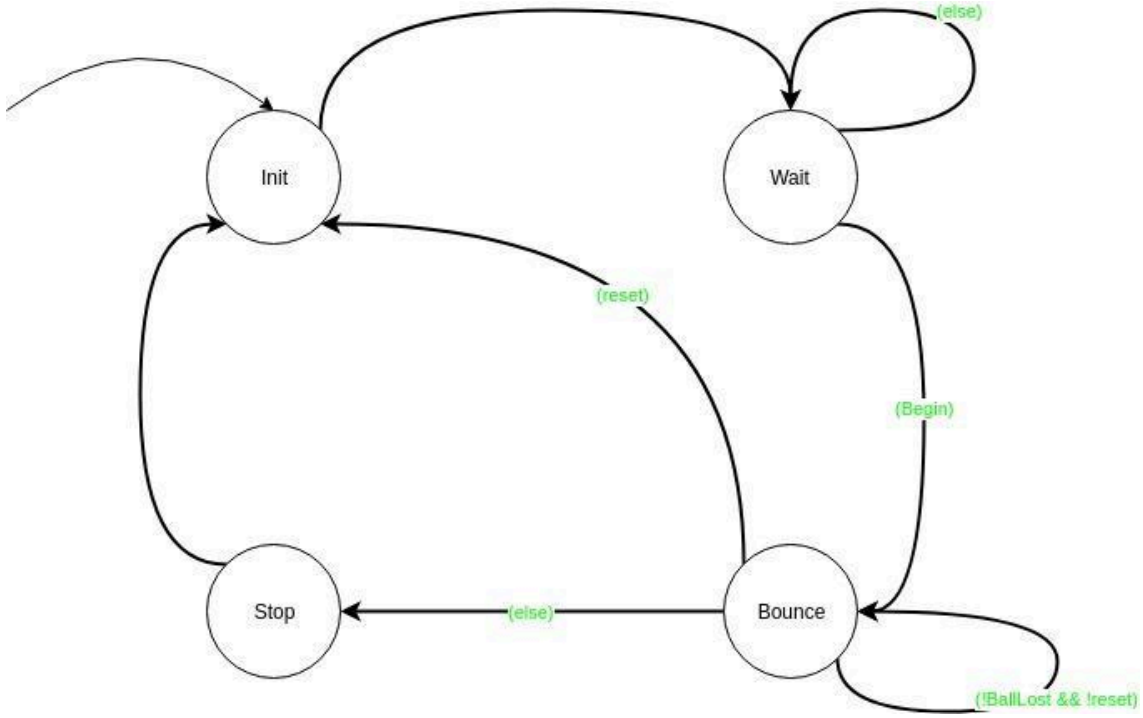


Software

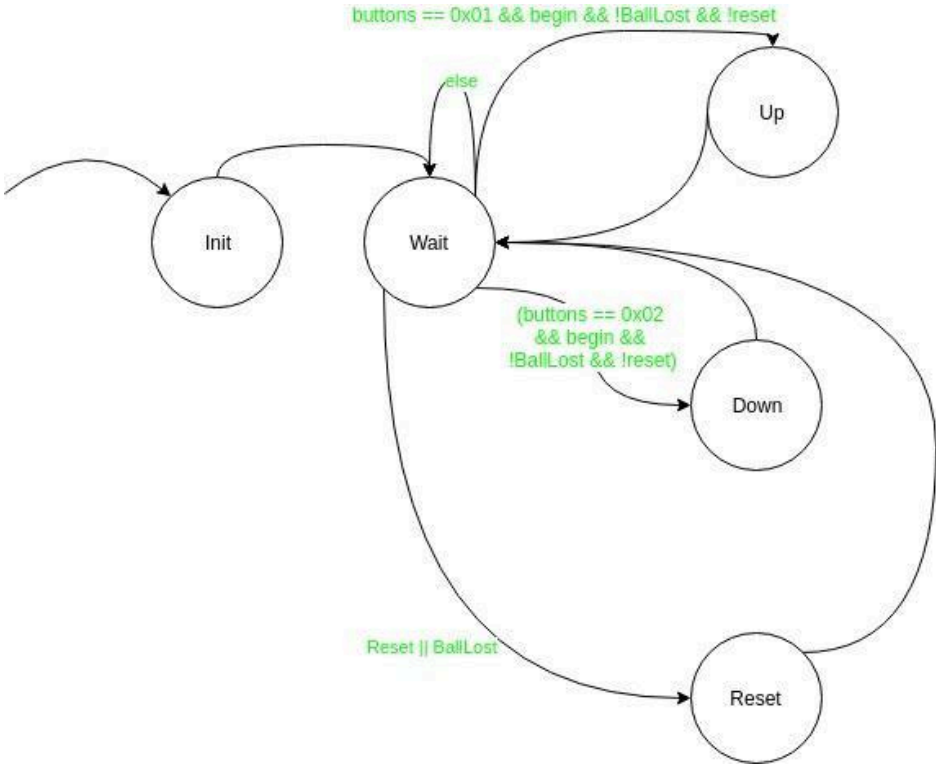
AI.h: Controls the pong AI in one player mode
AI state machine



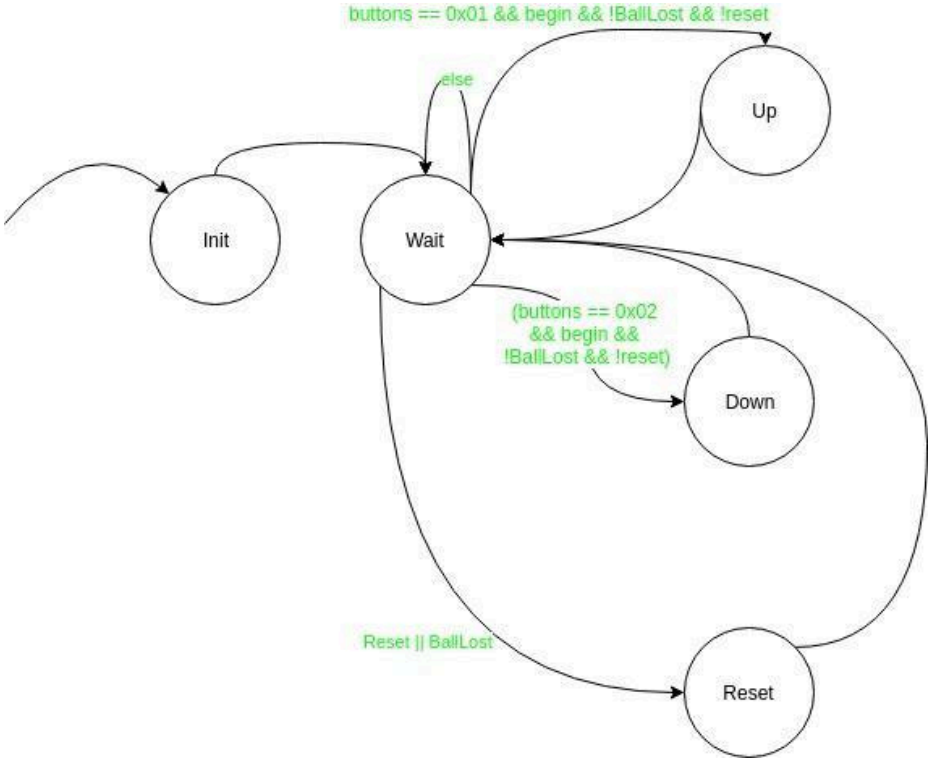
BallBounce.h: Controls the ball movement
BallBounce state machine



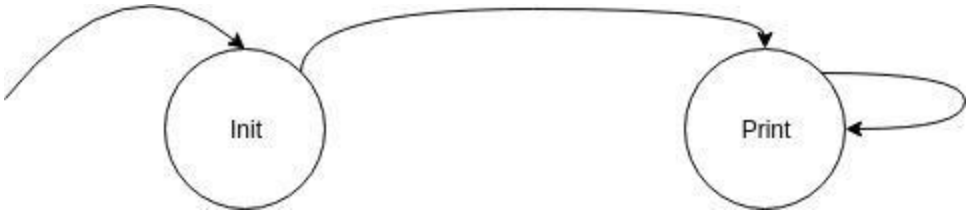
Player1.h: Controls the player 1 paddle
Player 1 State Machine



Player2.h: Controls the player 2 paddle
Player 2 State Machine

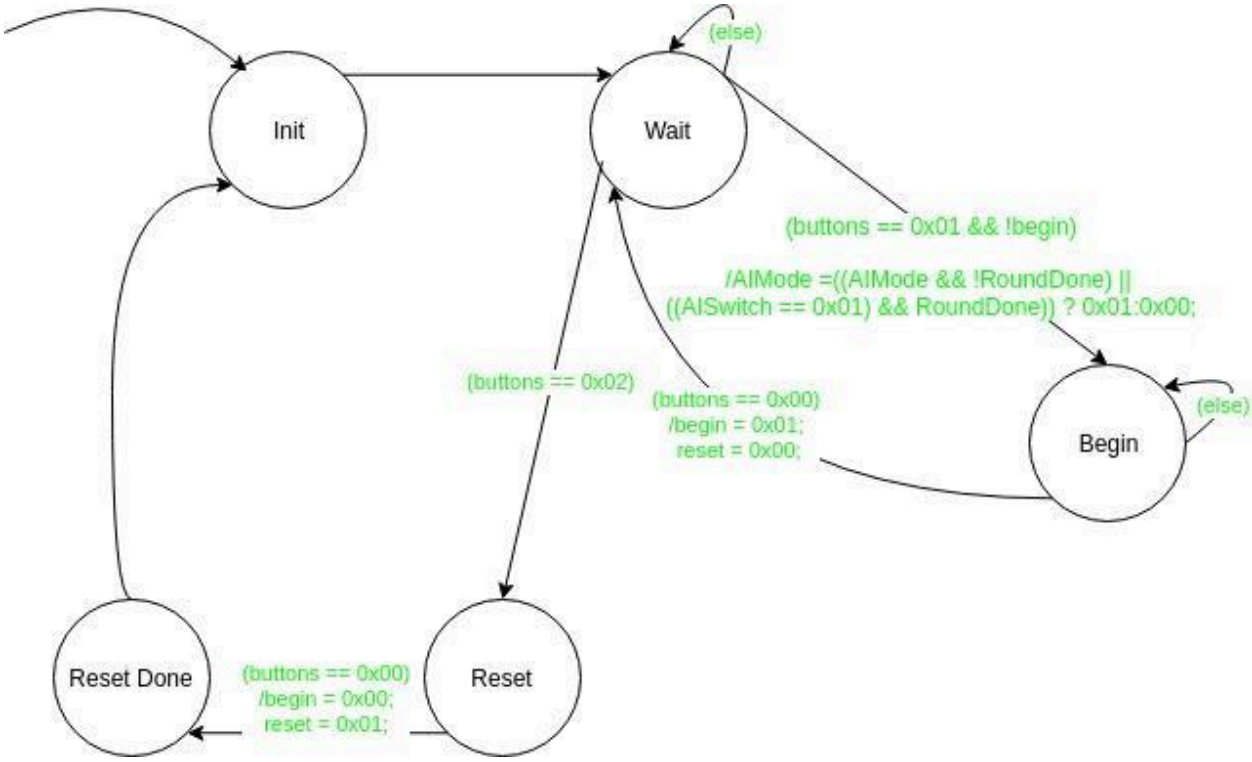


DisplayMatrix.h: Controls the displaying to the led matrix
Display State Machine

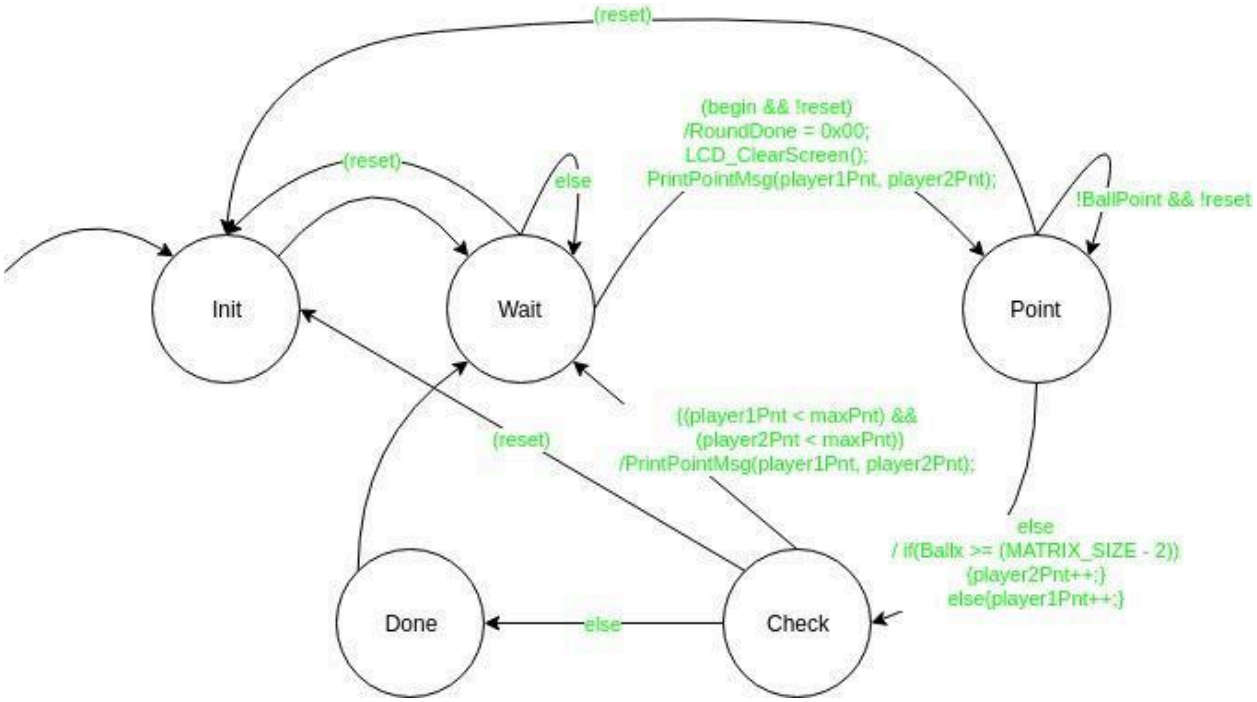


Game.h Controls when a round begins and ends

Game State Machine



Score.h: Controls the scoring of the game and displaying to the lcd screen
Score State Machine



This is an overview of the transitions of each of the state machines. To get more details of the, local variables, global variables, and actions on the state machines, reference the source code found in the Pong folder.

Complexities/Build-upons

Completed

1. Using LED matrix with shift registers
2. Game Logic
3. Second Player

GitHub Link

https://github.com/B-Tran/CS120BLabFinalProject

Youtube Link

https://www.youtube.com/watch?v=-MpYNrb79qQ&feature=youtu.be

Bugs and Shortcomings

When a player scores a point, the paddles will sometimes not reset to the default positions before the game begins. Possible fix is to fine tune the timing.

Future Work

I plan to add a Keyboard as a replacement input for the game, add a menu, and allow typing of the player names for the game at a later time.