# Battleship Game Project

Mohamed Aloraby H00410900

## Introduction:

The design and implementation of a Battleship game in C is demonstrated in this report. In the project, the player competes against an AI opponent in the classic Battleship game. The player attempts to sink the opponent's ships by taking turns attacking and positioning ships on a grid. The goal of the project is to use structured programming approaches and create a fully functional, playable game that develops problem solving abilities.

## Game Design:

The game is played on a 5x5 grid for both the player and the AI. Each grid cell can represent water (~), a ship (S), a hit (X), or a miss (O).

These are the 4 different types of ships in the game and how many of each type of ship are in the game.

| Ship Name | Units |
|---|---|
| Battleship | 4 |
| Cruiser | 3 |
| Submarine | 2 |
| Patrol Boat | 1 |

**Flow of the game and its mechanics:**

1. The user is required to manually position each ship by entering a coordinate and placement also saying if it will be horizontal or vertical.

2. The AI randomly positions its ships on the board.

3. The game then enters a loop in which the player and AI swap attacking.

4. The player enters coordinates to attack the AI's board, and the results hit or miss are shown.

5. The AI randomly selects valid coordinates to attack the player.

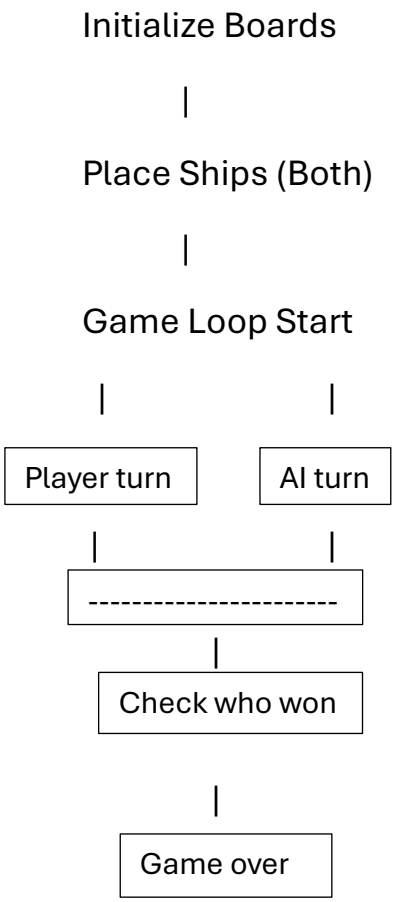
6. The game ends when one team has successfully sunk all of the opponent ships.

**Key implementation Details:**

- initializeBoards(): Sets up the boards with water (~).
- printBoard(): Displays the board with column headers A-E and row numbers 1-5.
- placeShipsManually(): Allows the player to input coordinates and directions to place ships.
- placeShipsRandomly(): Automatically places AI ships ensuring no overlap.
- playerTurn(): Accepts player input, checks for validity, and updates the AI tracking board.

- aiTurn(): Randomly selects a coordinate that hasn't been used to attack the player's board.
- checkWin(): Checks whether all ships on a board have been destroyed.
- A 2D character array for each board
- A ship struct for storing the ships name and sizes

**Flow chart:**



**Instructions for playing:**

Place each ship by entering:

A coordinate (e.g., B2)

A direction: 1 for horizontal, 0 for vertical

Take turns attacking AI by entering a coordinate.

Hits and misses will be shown.

First to destroy all ships wins.

Winning: The first player to sink all ships wins the game.