

Chess Game

A modern web-based chess game built with HTML, CSS (Tailwind), and JavaScript. Features include AI opponent, multiplayer support, and a beautiful responsive interface.

Features

Game Modes

- **AI Mode:** Play against a computer opponent with intelligent move generation
- **Multiplayer Mode:** Play against other players online using room codes

Game Features

- **Complete Chess Rules:** All standard chess rules implemented
- **Move Validation:** Proper piece movement validation
- **Check/Checkmate Detection:** Automatic detection of game-ending conditions
- **Move History:** Track all moves with algebraic notation
- **Board Flipping:** Flip the board to view from either player's perspective
- **Undo Moves:** Go back to previous moves
- **Responsive Design:** Works on desktop, tablet, and mobile devices

User Interface

- **Modern Design:** Clean, dark theme with Tailwind CSS
- **Smooth Animations:** Piece movement animations and visual feedback
- **Touch Support:** Swipe gestures for mobile devices
- **Keyboard Shortcuts:** Quick actions with keyboard commands

AI Features

- **Smart Opponent:** AI uses minimax algorithm with alpha-beta pruning
- **Configurable Difficulty:** Different AI difficulty levels
- **Move Evaluation:** Position-based move scoring

Multiplayer Features

- **Room System:** Create or join game rooms with unique codes
- **Real-time Updates:** Live game state synchronization
- **Player Management:** Handle player connections and disconnections

Installation

Prerequisites

- Node.js (version 14 or higher)
- npm or yarn

Setup Instructions

1. Clone or download the project files

2. Install dependencies

```
npm install
```

3. Start the server

```
npm start
```

4. Open your browser

Navigate to <http://localhost:3000>

Development Mode

For development with auto-restart:

```
npm run dev
```

How to Play

AI Mode

1. Click "Play vs AI" on the main menu
2. You play as White (bottom pieces)
3. Click on a piece to select it, then click on a valid square to move
4. The AI will automatically respond after your move

Multiplayer Mode

1. Click "Play vs Player (Online)" on the main menu
2. **To create a game:**
 - A room code will be generated automatically
 - Share this code with your opponent
 - Click "Copy" to copy the room code
3. **To join a game:**
 - Enter the room code provided by your opponent
 - Click "Join" to enter the room
4. The game starts when both players are connected

Controls

Keyboard Shortcuts

- **Escape**: Return to main menu
- **Ctrl/Cmd + Z**: Undo last move
- **Ctrl/Cmd + F**: Flip board
- **Ctrl/Cmd + N**: New game

Touch Gestures (Mobile)

- **Swipe Right**: Undo move
- **Swipe Left**: New game
- **Swipe Down**: Flip board

Game Rules

The game follows standard chess rules:

- **Pawns**: Move forward one square (or two from starting position), capture diagonally
- **Rooks**: Move horizontally and vertically
- **Knights**: Move in L-shape (2 squares in one direction, 1 square perpendicular)
- **Bishops**: Move diagonally
- **Queens**: Move in any direction (horizontal, vertical, diagonal)
- **Kings**: Move one square in any direction
- **Check**: King is under attack
- **Checkmate**: King is under attack with no legal moves to escape
- **Stalemate**: No legal moves but king is not in check

Technical Details

Frontend

- **HTML5**: Semantic markup
- **Tailwind CSS**: Utility-first CSS framework
- **Vanilla JavaScript**: No frameworks, pure JS
- **Socket.IO Client**: Real-time communication

Backend

- **Node.js**: Server runtime
- **Express.js**: Web framework
- **Socket.IO**: Real-time bidirectional communication

AI Implementation

- **Minimax Algorithm**: Game tree search
- **Alpha-Beta Pruning**: Optimization for better performance
- **Position Evaluation**: Material and positional scoring

File Structure

```
chess-game/  
├─ index.html      # Main HTML file  
├─ styles.css      # Custom CSS styles  
├─ chess.js        # Chess game logic  
├─ app.js          # Main application logic  
├─ server.js       # Node.js server  
├─ package.json    # Dependencies  
└─ README.md       # This file
```

Browser Support

- Chrome (recommended)
- Firefox
- Safari
- Edge

Contributing

Feel free to contribute to this project by:

- Reporting bugs
- Suggesting new features
- Improving the AI algorithm
- Enhancing the UI/UX

License

This project is licensed under the Aditya Raj Singh's License.

Acknowledgments

- Chess piece Unicode characters
- Tailwind CSS for styling
- Socket.IO for real-time communication
- Chess community for inspiration

Enjoy playing chess! ♟️