# AI Lab Project Proposal

# Quoridor AI Opponent

## Team Members:


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## Project Objective:

To develop a simplified version of the board game Quoridor where a human player competes against an AI. The AI will use search-based algorithms to decide on optimal moves, either moving in 4 directions or placing walls to block the opponent.

## Game Rules and Constraints:

- A 9x9 board.
- Two players: one human and one AI.
- Each player starts with 10 walls.
- Players can either:
  - Move one space up, down, left, or right (if not blocked).
  - Place a wall to hinder the opponent.
- Invalid moves include:
  - Moving into a wall or off the board.
  - Placing a wall that completely blocks a player's path to the goal.
- The goal is to reach the opposite side of the board before the opponent.

## AI Approach:

- The AI will be search-based only.
- Algorithms considered:
  - Breadth-First Search (BFS) for shortest path.
  - Minimax or A* for decision-making.
- Heuristics will consider:
  - Distance to goal.
  - Opponent's position.
  - Remaining walls.

## Expected Outcome:

- A playable version of Quoridor against an AI opponent.
- AI makes valid decisions and provides a challenging gameplay experience.
- Proper validation for moves and wall placements.

## Technologies:

- Programming Language: Python
- Libraries: Pygame