Gebze Technical University
Computer Engineering

CSE 241

Winter Project Report

Hex Game

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1.Introduction[1]

1.1 About Hex

Hex was invented by the Danish poet and mathematician Piet Hein. He introduced the game in 1942 in a lecture to students at the Niels Bohr Institute for Theoretical Physics. The game soon became popular in Denmark under the name of Polygon. It was independently re-invented by John Nash in 1948 when he was a graduate student at Princeton University. Parker Brothers marketed a version of the game in 1952 under the name Hex.
A Hex-playing analog machine was constructed by Claude Shannon and E. F. Moore in 1953, both at that time on the staff of Bell Telephone Laboratories.

The game was presented to the general public by Martin Gardner in Scientific American in 1959.

1.2 Basic Rules

Hex is a two-player game played on a rhombic board. The classic board is 11x11, but it can be any size.

The players, Red and Blue, take turns placing pieces of their color on empty cells of the board. Red's objective is to connect the two opposite sides(left and right) of the board with a chain of red pieces. Blue's objective is to connect the two opposite sides(top and bottom) of the board with a chain of blue pieces.

Red moves first.

1 - https://icga.org/icga/games/hex/#:~:text=Hex%20is%20a%20two%2Dplayer,empty%20cells%20of%20the%20board.

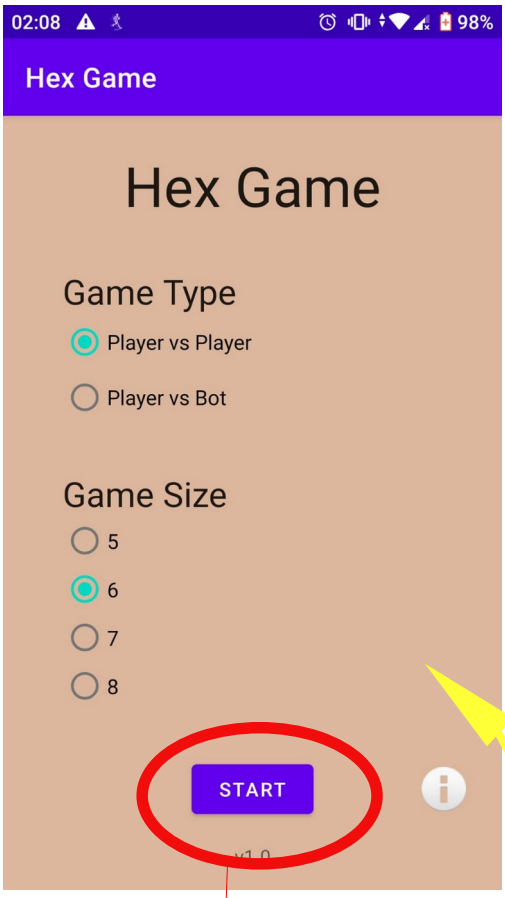
2.1 About Computer’s Move

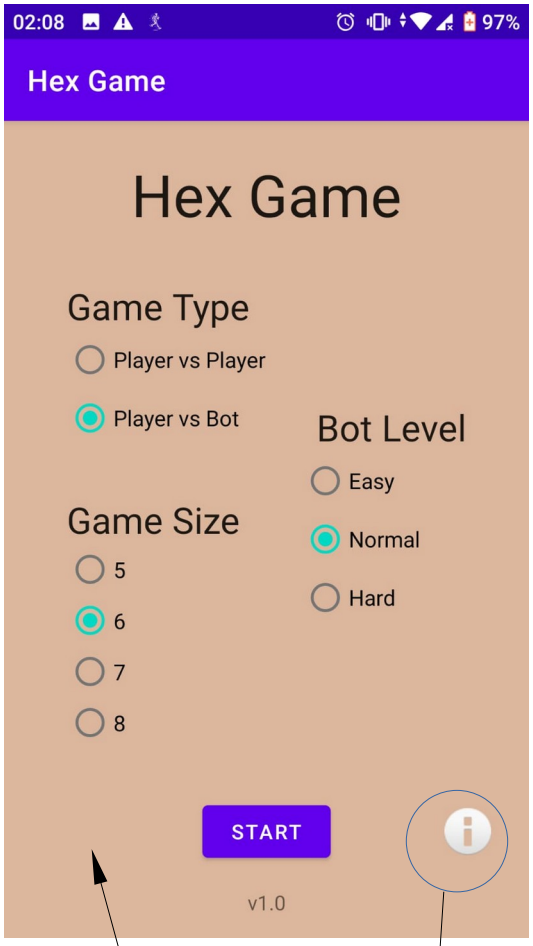
In this project, We were expected to use Minimax Algorithm for computer’s move but I could not use it or integrate any code . So I used my code that plays computer’s move ,which was handwritten by me.

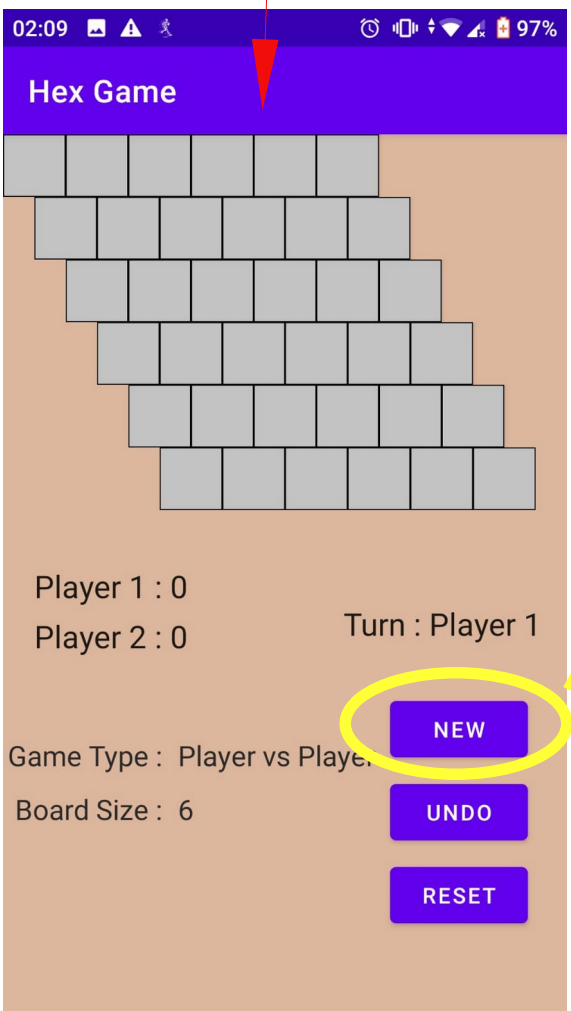
2.2 Pseudocode For Computer’s Move

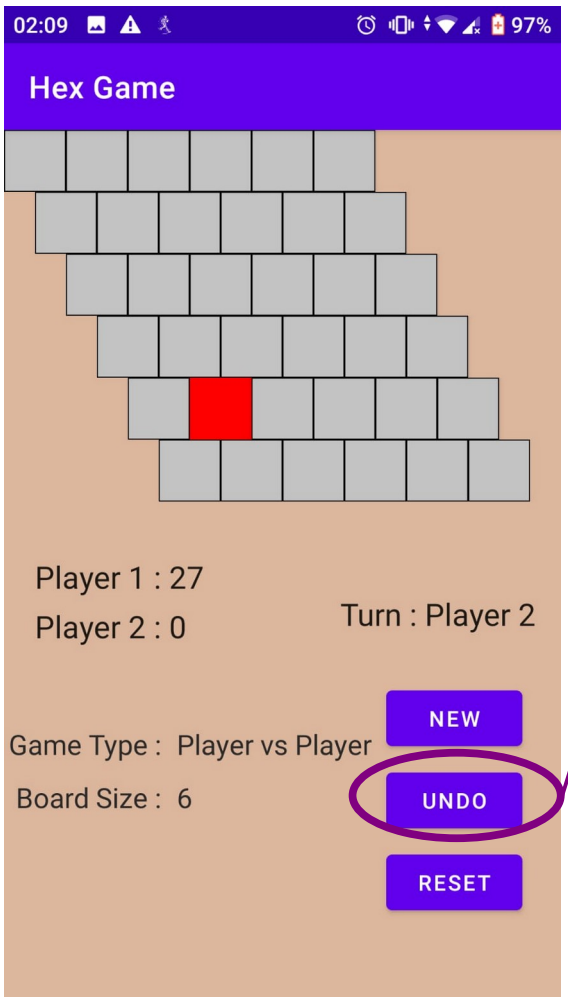
```
Get bot level
If bot level == “Easy” Then
        Play random cell
ElseIf  bot level == “Medium” Then
        Get player’s last move
        For each neighbor cells of player’s move do
                If neighbor cell is unplayed
                        Play that cell
                        Return to player’s move
                End if
        End for
ElseIf bot level == “Hard” Then
        Get player’s last move
        Calculate new coordinate from player’s move
        If new coordinate is unplayed
                Play that coordinate
        Else
                For each neighbor cells of new coordinate do
                        If neighbor cell is unplayed
                                Play that cell
                                Return to player’s move
                        End if
                End for
                Play random cell //That means all the neighbor cells were played
Else // Unsupported bot level
   Throw exception
End If
```

Screenshots





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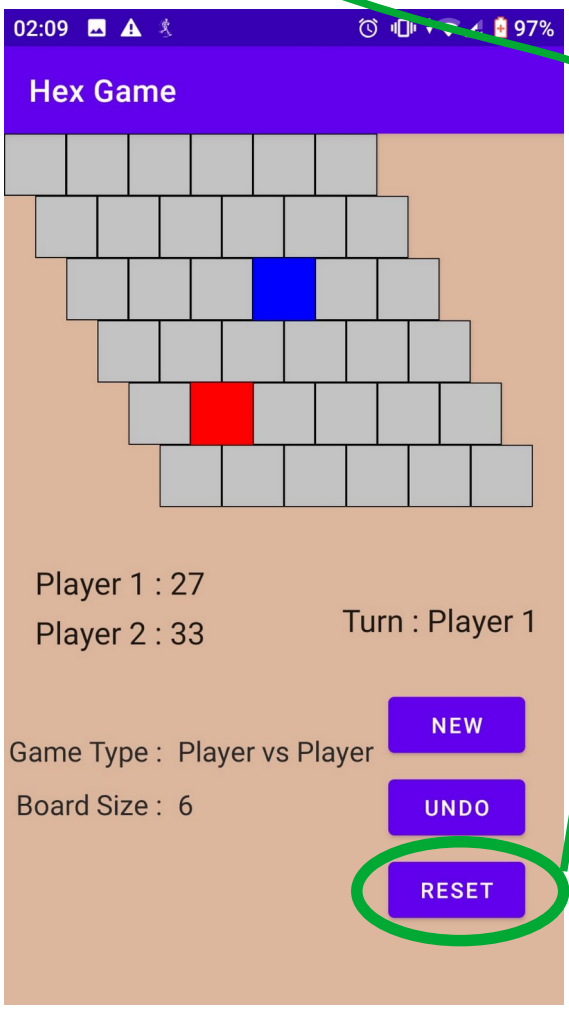
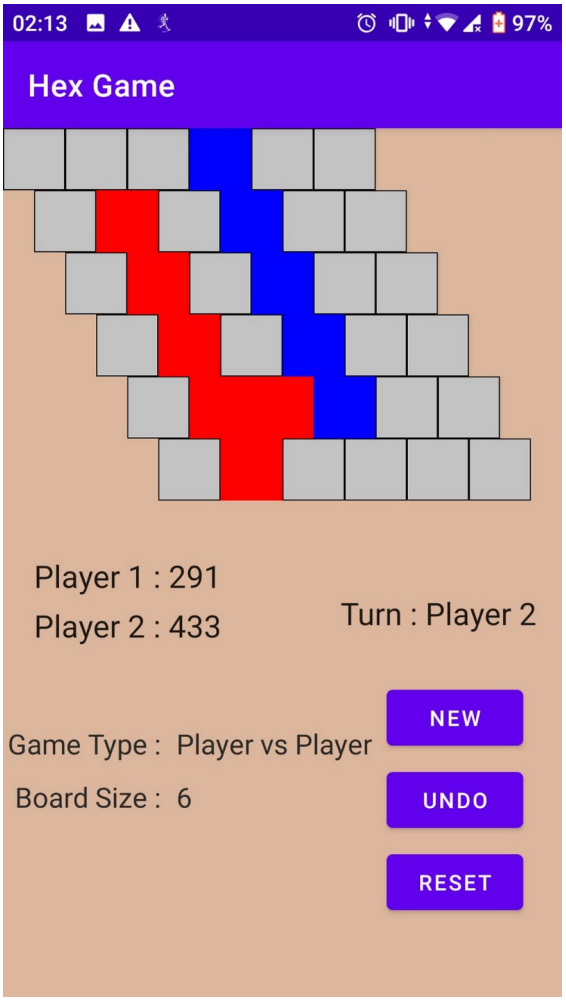
97%
Hex Game
Player 1 : 27
Player 2 : 0
Turn : Player 2
Game Type : Player vs Player
Board Size : 6
NEW
UNDO
RESET


02:09
97%
Hex Game
Player 1 : 27
Player 2 : 33
Turn : Player 1
Game Type : Player vs Player
Board Size : 6
NEW
UNDO
RESET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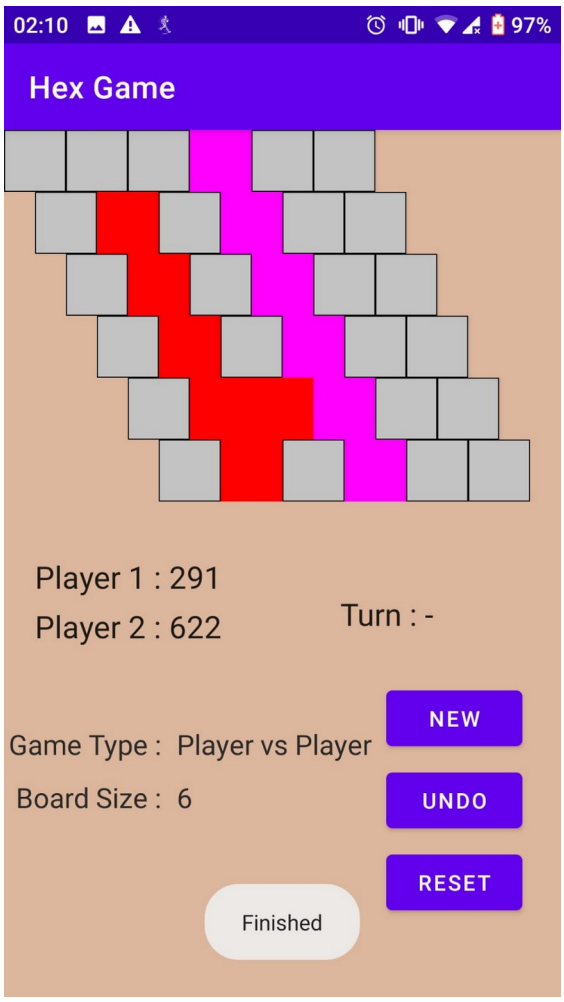
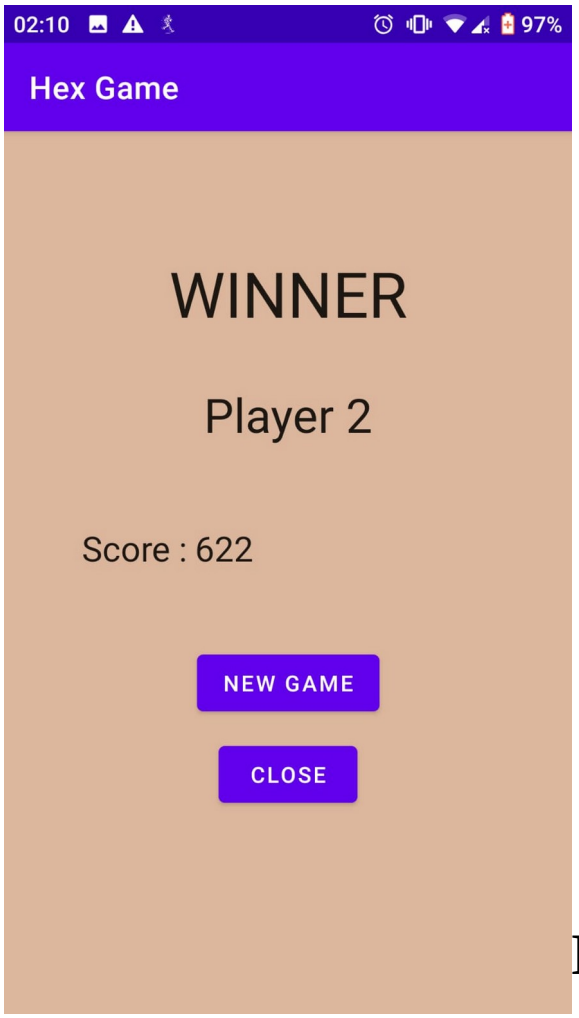
Hex Game
Player 1 : 291
Player 2 : 433
Turn : Player 2
Game Type : Player vs Player
Board Size : 6
NEW
UNDO
RESET


02:10
97%
Hex Game
Player 1 : 291
Player 2 : 622
Turn : -
Game Type : Player vs Player
Board Size : 6
NEW
UNDO
RESET
Finished


02:10
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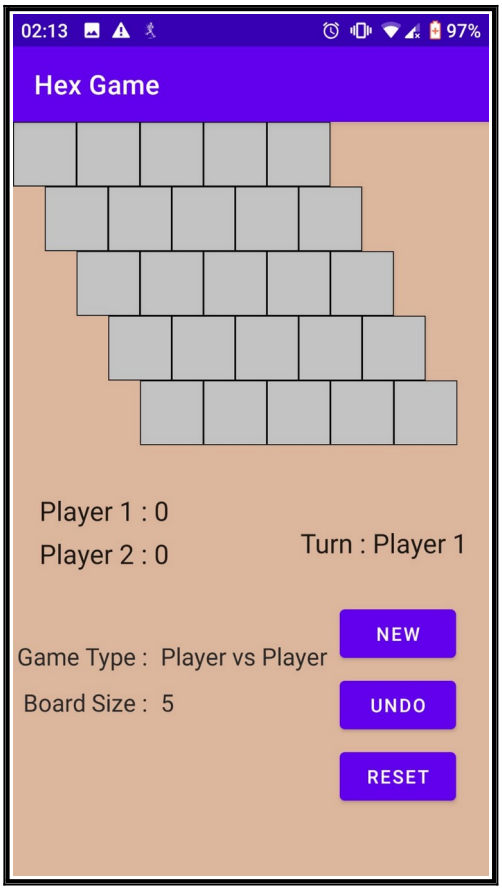
Hex Game
WINNER
Player 2
Score : 622
NEW GAME
CLOSE

Extras: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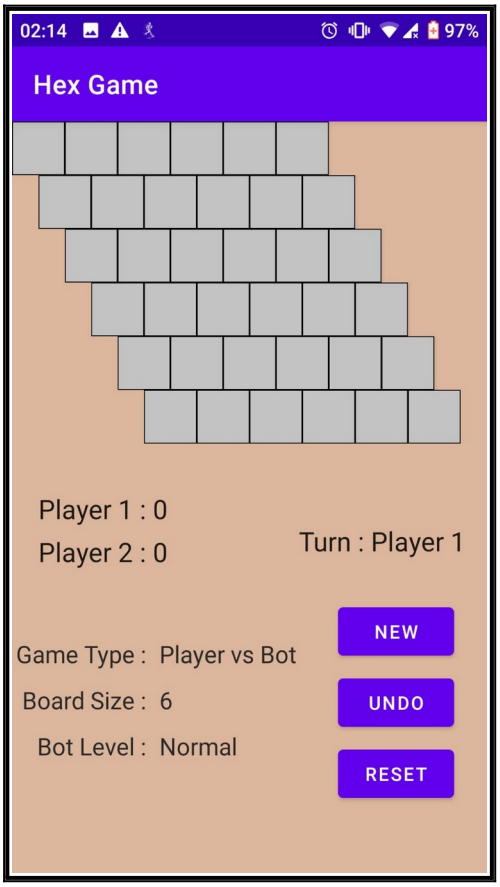
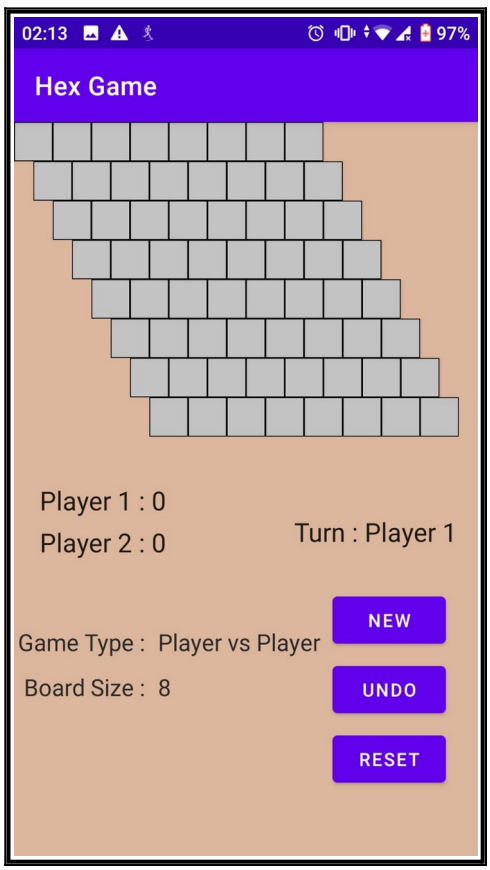
97%
Hex Game
Player 1 : 0
Player 2 : 0
Turn : Player 1
Game Type : Player vs Player
Board Size : 5
NEW
UNDO
RESET


02:14
97%
Hex Game
Player 1 : 0
Player 2 : 0
Turn : Player 1
Game Type : Player vs Bot
Board Size : 6
Bot Level : Normal
NEW
UNDO
RESET


02:13
97%
Hex Game
Player 1 : 0
Player 2 : 0
Turn : Player 1
Game Type : Player vs Player
Board Size : 8
NEW
UNDO
RESET