**Project Proposal**

**(Group 14)**

The purpose of the project is to create a working version of the board game Ludo.

Ludo is a strategy board game for two to four players, in which the players race their four tokens from start to finish according to the rolls of a single die.

The program is going to start by asking the user for the number of players and the color assigned to each one of them.

The game is going to be divided into several classes that which can be categorised into the following groups:

1. Control/Support
2. Game Elements
3. Graphic Interface
4. Artificial Intelligence

The classes are: Class (Type of Class)

1. Main (Control/Support)
2. Board (Game Elements)
3. Dice (Game Elements)
4. Token (Game Elements)
5. GameType (Control/Support)
6. Player (Game Elements)
7. Selector (Graphic Interface)
8. GUI (Graphic Interface)
9. Autoplay (Artificial Intelligence)

10. AI (Artificial Intelligence)

11. QLearning (Artificial Intelligence)

The game is supposed to run in the following way-

1. Main initialized an instance of Selector prompting the user to input the initial settings such as the number of players and the color assigned to each player.
2. Using the input gathered from the Selector class, an instance of GameType is generated. The constructor for GameType takes the game settings above as arguments.
3. There will be method called createGUI that will take this instance of GameType as an argument and create a graphic interface accordingly.

Game Start and Execution-

1. If the player who has the first turn is not manual, the dice is rolled automatically. If it is manual, a mouse click will roll the dice.
2. If player is set to auto, the Autoplay class will calculate the best possible move using the QLearning class. If it is manual, the position of the token will be moved according to the mouse click.
3. After every move, it is checked if the token arrived at its final/desired position and if it does, the goal counter for that player increases and that token is taken out of the game.
4. If all 4 of a player’s tokens arrive at the goal position, the player becomes inactive and goes to the list of winners.
5. When all players have their tokens in the goal position, the game ends and it displays the results.

Autoplay-

The implementation of Autoplay is used when the user decides to play against the computer instead of having all 4 players as humans. This will decide the players moves according to AI which will first verify if the move is valid with conditionals and then use a method bestToken to select the next move. This method will read the rewards of each possible move from a MoveTable and then select the token will the highest reward.

The MoveTable is generated from QLearning by simulating millions of games of ludo and updating the reward of each tile according to a given rule.

The MoveTable is going to be created beforehand and used by the controller during a game.