Pong Report

1. **Introduction**

This report describes the process of creating a Pong game in the Java-based programming language Processing. Players can use keyboard inputs to control bats that resemble paddles in order to compete in the game that closely recreates the classic Pong game. The main objective is to keep the rally going by skillfully moving the bats to hit the ball back and forth across the screen. The game ends when one of the players fails to intercept the ball, resulting the ball to pass the player’s bat, resulting in a winner.

This report includes an in-depth description of the game's elements and design, outlining the additional implemented features on the pong game based on the code provided during the lecture.

1. **Game Description**

This version of the Pong game is a classic arcade-style video game with a modern twist, focusing on the competitive and skill-based nature of table tennis. This game is a two-player-game and both players have to control their bats to keep the ball rallying and score as many points possible until a player miss, terminating the game.

**2.1 Objective**

The primary objective of the game is to score points by successfully hitting the ball with the bat. The game difficulty escalates progressively as the game unfolds. The game ends when either player fails to intercept the ball, signifying the conclusion of the gameplay.

**2.2 Goal**

Throughout this variation of Pong, the main goal is to defeat the opposition and win. Players must carefully plan their bat motions and timing in order to achieve this goal, which will keep the ball's trajectory within the boundaries of the playing field. As the game's stages progress, the inherent complexity increases, putting more of a demand on players' skills.

* 1. **Game Element**

The game elements listed below work together to create the classic Pong gameplay experience with additional progressive and dynamic features. Players control the bats to hit the ball, score points, and experience changes in bat length, ball speed, and ball color as they progress through the game.

1. Ball:

The ball is the central object of the game. It moves continuously across the game area, and the objective is to hit it with the bats to prevent it from passing a player’s side of the screen.

1. Bats:

Bats are the player-controlled objects used to hit the ball back and forth. In a two-player Pong game, each player controls one bat, usually located on opposite sides of the screen. The bats can move both vertically and horizontally within a certain size of area.

1. Score:

Each player's score in the game is recorded. When the ball hits the player's bat, a goal is scored. When a player misses the ball and ball hits either the left or right side of the wall, the game is over.

1. Levels:

The game includes various levels that affect gameplay. There are three types of level in this version of Pong:

* 1. Bat Level: As a player scores points, one's bat length shrinks.
  2. Speed Level: When the combined score of both players hits certain scoring milestones, the level of ball speed increases.
  3. Color Speed: As the cumulative score of both players rises, the ball's color becomes darker.

1. Game Console Style:

The game screen is designed in a "game console" style, featuring a black background, a dashed line in the middle, and white text to show scores and levels.

1. Key Controls:

Players can control the bats using keyboard inputs ('w', 's', 'a', 'd', arrow keys).

1. Ball Behavior and Dynamics:

The ball's movement includes collision detection and response with the bats and borders.

1. Game Initialization and Reset:

When the game begins to run, the game state is initialized, a new ball is created, and the scores are reset.

* 1. **User Manuel**

**Bat Control**

Players can control how their individual bats move in this version of Pong by pressing particular keyboard keys. These controls allow for both vertical and horizontal movement, enabling players to tactically place their bats for precise ball interception and responsive gameplay.

**Player 1 Controls:**

* + - 'w' Key: Move the bat upward.
    - 's' Key: Move the bat downward.
    - 'a' Key: Move the bat to the left.
    - 'd' Key: Move the bat to the right.

\*\*\*The key must be lower case

**Player 2 Controls:**

* + - 'Up' Arrow Key: Move the bat upward.
    - 'Down' Arrow Key: Move the bat downward.
    - 'Left' Arrow Key: Move the bat to the left.
    - 'Right' Arrow Key: Move the bat to the right.

**Game Termination**

To exit the game at any point, press the 'ESC' Key. This action will immediately terminate the ongoing game session and exit the application.

1. **Game Design**

This section outlines the basic features that inherent from the lectures code and the extended implementation of additional features.

**3.1 Basic Features**

1. Ball Behavior and Dynamics:

The behavior of the ball in our Pong game is fundamental to the overall gameplay experience.

1.1. Ball Movement:

The ball follows a continuous trajectory, moving horizontally and vertically within the game window.

1.2. Collision Detection:

The ball constantly checks for collisions with various game elements, including the bats and the top and bottom edges of the game window. Upon collision, the ball's behavior is altered to simulate a realistic bounce.

1.3. Ball-Bat Interaction:

When the ball collides with a bat, its direction changes based on the angle at which it strikes the bat.

1.4. Border Collision:

If the ball hits the top or bottom edge of the game window, it changes its vertical direction, ensuring it remains within the bounds of the playing field. When the ball hits the left or right edges, it signifies the end of a round, resulting in a point for the opposing player.

1. Player Interaction:

Players are given straightforward controls to manipulate their respective bats. Player 1 utilizes the keys 'w' and's' for vertical movement, while Player 2 uses the arrow keys 'Up' and 'Down', giving players full control over the bat's location and allowing for dynamic and responsive gameplay.

**3.2 Implemented Features**

1. Scoring Mechanism:

The game features a simple scoring system, with each successful hit of the ball resulting in a point for the player. Scores are displayed prominently on the screen for both players, updating players on their progress.

1. 2D Bat Movement:

The bats can move in two dimensions in the game. Within a certain area, players have control of the bat's vertical and horizontal movements, allowing for precise positioning and tactical movement. In addition to horizontal movement, player 1 can use the keys 'a' and 'd' for horizontal movement while Player 2 moves using the arrow keys 'Left' and 'Right'.

1. Progressive Ball Speed:

The game features a gradual increase in ball speed as players hit predefined scoring thresholds (5, 10, 30, 40 points). This feature raises the thrill and difficulty level, keeping the gaming interesting and dynamic. The speed’s difficulty levels for both players are displayed on the screen, updating players on their difficulty level.

1. Bat Length Variation:

This version incorporates a dynamic change in bat length to heighten the game's competitive element. Players' individual bats gradually get shorter as they earn points. Players must adjust their gameplay to factor in the shrinking characteristics of their bats as a result of this feature, making it an exciting strategic component. The bat’s difficulty level for each player is displayed on the screen, updating players on their difficulty level.

1. Dynamic Ball Color Change:

The game introduces a visual feature on the color of the ball. The color of the ball changes gradually from bright to darker shades as the combined score of both players crosses specific milestones (15, 20, and 25 points). Since the ball is more difficult to see against a completely dark background, this feature not only adds a visual component to the game but also increases the level of difficulty.

**PDF report** with description of your game and the implemented features (minimum of 2 pages, Times New Roman, font size 12, 1,15 spacing)  
Please also shortly describe how your basic PONG game works.  
(named: Firstname\_Lastname\_PONG-Description)