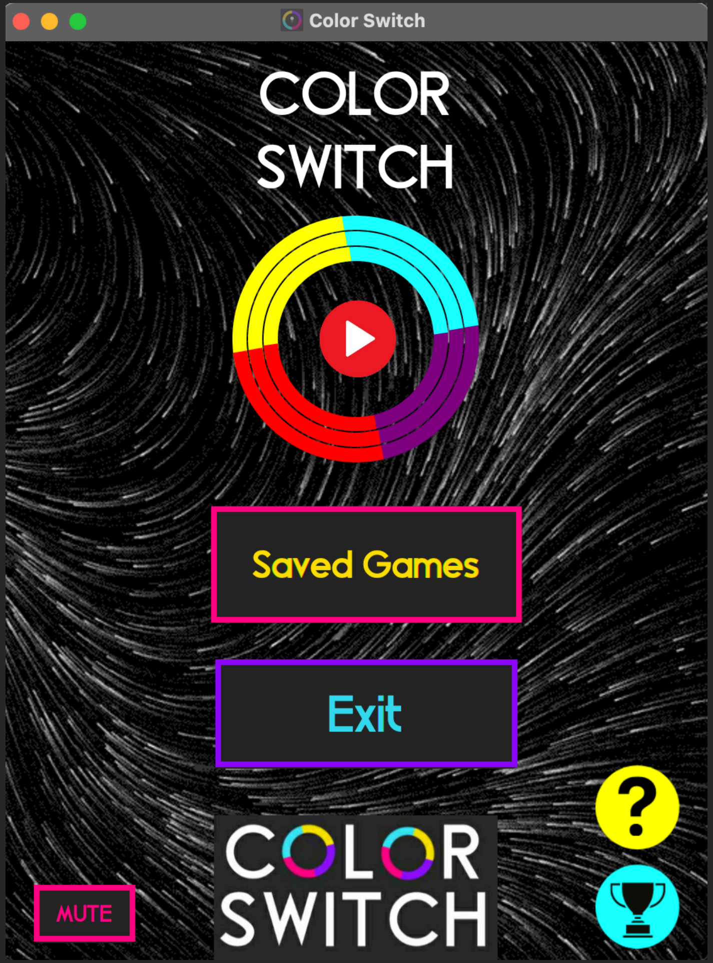
# COLOR SWITCH

## AP COURSE PROJECT



## Design and Implementation

1. Our Game begins at the Main Menu, which implements Serialization and stores all the Serializable data (best scores, total stars, previously saved Games). Also gives access to other basic screens, using Button presses provided using the Main Menu's FXML Controller file.
2. The Saved Games Menu screen displays last 4 of the previously Serialized and stored Games along with their scores by iterating over the savedGames ArrayList and displaying them.
3. A game can be started either by clicking the circular Play Button, or by selecting a saved game.
4. On initiating a New Game, the Game class' constructor is called and a new Game Object is instantiated. On calling, a new Ball Object and multiple Obstacle subclass objects are created, alongside dynamically creating Stars and ColorSwitchers.
5. In case of initiating a previously Saved Game, the attributes of that Game are used to instantiate a new Game class using a parameterized Constructor. Game objects are initialized, and the game can now be played from the same state it was left in.
6. The Pause Menu and End Game Menu are also displayed using FXMLs and Controllers, with each giving the required options.

## Gameplay Design

1. The Gameplay is controlled by an Animation Timer. The Ball is made to fall as if under gravity by continuously refreshing its position in each iteration of the Timer Loop.
2. The obstacles are created by coding each obstacle using the Shape class in JavaFX. The scrolling of the screen is also achieved by Animation Timer following the movement of the ball
3. Obstacles are generated dynamically. As soon as one obstacle moves below the screen, a new obstacle is added to the ArrayList, keeping it of constant size and increasing the game's efficiency and performance.
4. Collision of the obstacles is detected by checking the intersection of the ball with each fundamental Shape component (Arc, Line).
5. The game difficulty increases with increasing game levels. This is achieved by increasing the frequency of one full rotation of every obstacle.

## AP Concepts Used

The concepts taught to us in AP during the semester turned out to be crucial and were heavily implemented-

1. We used concepts such as Inheritance, Interfaces and Abstract Classes in multiple places.
2. Extensive use of Java Collection Framework.
3. Implemented Exception Handling wherever possible.
4. Use of serialization and Design patterns – Singleton and Observer in multiple places.

## Problems Faced

1. Due to the online semester, collaboration was tougher. Both of us were needed to be well versed in VCS.
2. Extensive use of JavaFX. A lot of time was spent in reading and implementing methods from documentation.
3. An effective Serialization logic was tough to figure out, since there were a lot of non-serializable components.
4. The dynamic generation of Obstacles and other Gameplay objects during the game posed a challenge.

# Individual Efforts

Almost all our project's components were made after extensive discussions and ended up having both of ours inputs. The project was coded together majorly, and we both contributed equally.

## Ansh Arora (Roll No 2019022)

- Created FXML Pages and GUI designs for all Screens and Menus.
- Added all Button Functionalities and transitions from one screen to another
- Implemented the ball and physics of its movement and ascension on the screen.
- Implemented Bonus components like hover designs and added Sounds to the game.
- Implemented Serialization and Deserialization in the app so that can save and resume games.

## Nandika Jain (Roll No 2019064)

- Created all obstacles and implemented their dynamic generation during the gameplay.
- Implemented collisions, star collection and color switching in the game.
- Implemented the revival of the game and display of stats on various screen
- Implemented the Golden Star Bonus Component inside the Game
- Improved the implementation of the GUI and smoothed out the Game's Physics.

# BONUS FEATURES

1. Added the Golden Star – A twist on the game whereby the distinguishable, randomly generated Golden Star gives the user added advantage by rewarding the user with extra stars.
2. Added the Stats Screen – A place on the Main Menu where you can quickly come and view your lifetime stats for the game. The stats are serialized so that your game data isn't lost.
3. Added an Instructions Screen to the Main Menu
4. Added fun sounds for almost every element of the game, and music to the Main Menu for entertaining the player.
5. Added the Speed feature, in which the Obstacles slowly become faster as we proceed in the game, thus increasing the challenge.
6. Easter Egg Zen Mode – For no collisions and with music in the background.
7. Added Hover Effects and sounds for buttons.