# Introduction

Breakout is a fun, entertaining, and challenging game. It is a one player game, where the goal is to break past the barrier as fast as you can. It contains many levels in which the difficulty increases and adds excitement to the players experience during the game. It is simple and easy to play with its minimalistic usage of buttons and easy to follow instructions. You can compete against your friends to see who can achieve the highest score. This game is a classic hit.

# Team

The team began with Jose Diaz, Jamar Golden, and Ryan Tamanini. Unfortunately, Ryan failed to communicate in any way, leaving all the workload to Jose and Jamar. We split the workload evenly and communicated exceptionally to ensure meetings were set and everyone was up-to-date with any changes to the code or any changes to the plan. One of the only weaknesses was having one less person to contribute to the project. This in turn hindered our productivity because we had a larger workload but the same amount of time which made it difficult to complete. In the end, the team dynamic was great, and we used each other’s strengths to thoroughly contribute to the project.

# Features Implemented

The overall functionalities of the game include the movement and behaviors of the paddle, the disappearance of the bricks, and the movement and behaviors of the ball. The paddle is controlled by user input from the left and right arrow keys. When the key is pressed down the paddle moves from left to right at increments of 7 pixels and upon release of the key all movement stops. The paddle is bounded on a specified “y” variable and does not exceed the confinements of the window. The ball is generated at a random x-coordinate and fixed y-coordinate upon every start. Its initial speed is based on an “x” and “y” ration of (3, 3). This speed is then altered based on where the ball makes contact with the paddle which in tail changes the balls trajectory. When the ball makes contact with any surface it then bounces off into another direction. When the ball makes contact with the top border of the window, it notifies you that you have completed a level. When it makes contact with the bottom border, it notifies you that you have failed the level. The bricks are stationary entities that are bounded by the rectangle around them. When the ball collides with a brick, the brick then moves off the screen signifying that that section of the wall is broken. Depending on the level, the amount of times required to hit the brick is increased to elevate the difficulty. The leaderboard system takes in the initials of the player after they have lost or won the game and records that with their score in a separate document. We added a life counter that counts down every time the ball touches the bottom of the screen. Once it hits the bottom, the ball resets and the life count will go down by one. Once you reach 0 lives, it displays a game over screen. Lastly, we have the scoring mechanic which takes the players time to calculate how many points they attained. The player is given a score based on how quickly they could complete the game. If a player loses before reaching the end there is a two-minute penalty added to their time for every level they didn’t complete. If the player doesn’t make it past the first level, then they receive a score of zero and will not recieve a spot on the leaderboard.

* User controlled paddle
* Ball Movement
* Ball deflection off other objects
* Bricks Disappear upon ball collision
* Brick Resilience increases throughout level progression
* Ball Direction change upon collision with specific areas on the paddle
* Random initial Ball Location
* Scoring system
* Three lives feature
* Paddle obstacle at top of the screen
* Constant change of brick color
* Additional Points for Bricks hit

# Beyond the standard Features

After the standard game features, we included three of our own ideas to make the game more fun as well as a little bit more challenging for the player. The first being that at the top of the screen there is another paddle which moves at a constant speed back and forth. This paddle will be used as another obstacle for the player so that the ball will be sent back if it collides with the paddle. The speed of the paddle will also change as the player progresses through the levels making it even more difficult to win the game.

A second feature is the addition of extra points for the amount of bricks broken by the end of the game. The Bricks are counted at the end and then that number is added to the players total score.++++++ This gives other players a better chance of receiving a higher score and will make the game more competitive.

Our third additional feature is mainly for aesthetic purposes. It changes the color of the bricks every time the ball hits a brick. We made it do this by making the collision a trigger. When the ball collides with a brick, it takes a new image out of a list we created with different colored bricks and implements it to the image used for the bricks.

# Software Development Process

Throughout the software development process, we as a group learned a lot when it comes to developing a fully functional program. While working on this we had to learn a lot of the pygame syntax on the fly. This helped to teach us patience when it comes to coding as well as improved our problem-solving skills because a lot of the work was either trial and error or troubleshooting any issues that popped up. We obtained a better understanding of how pygame functions and this project is helping us gain the tools necessary to continue working with pygame if we please. The coding skills that we are developing will be useful in the future. The most challenging aspect of working in a team is making sure everyone gets a say in how we execute the task. We also found the workload challenging due to the fact that we were missing a partner. I believe our team did a good job in making sure everyone contributed and expressed their ideas.

# Future Work

In our original plans, we strategized a plan to make the game politically themed. We were planning to play off the idea of Trumps wall proposal and make the bricks represent the wall. We wanted to add trumps head as an obstacle at the top of the screen and if you were to hit him then you be reflected which would make the game harder. If we had more times these are features that we would have added. It is possible that we will continue to work on the game to implement these ideas and make it the way we had originally thought about.

# Code Listing

breakout.py

# Images



