



USER GUIDE:

BLOONS TOWER DEFENSE

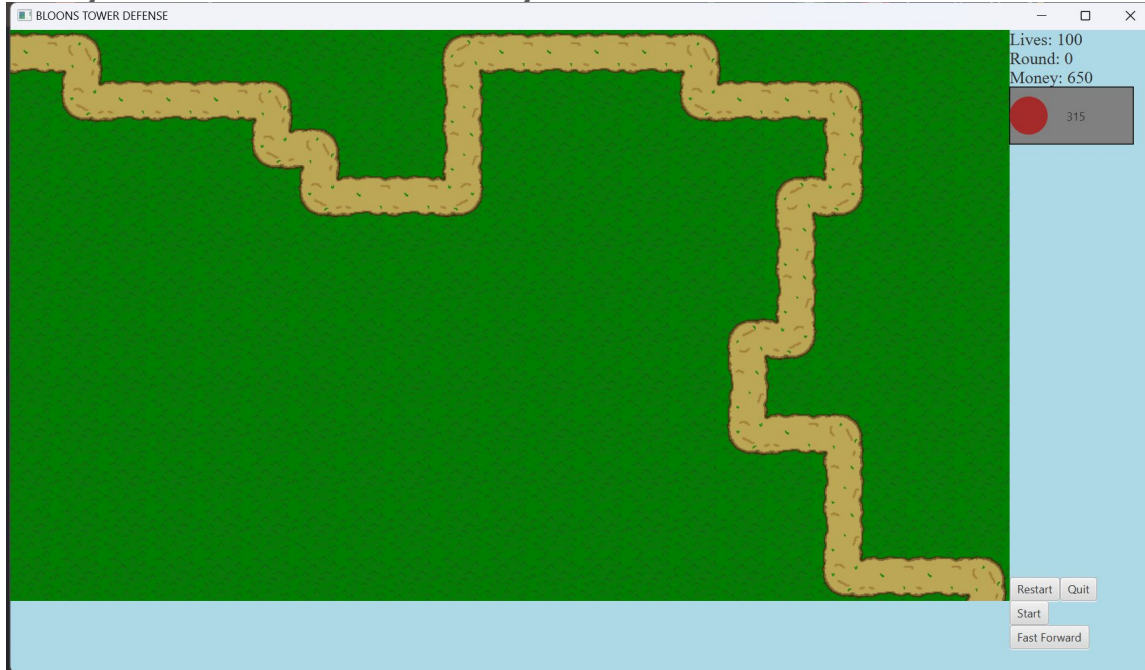


Premise

As the name suggests, Bloons Tower Defense (BTD), is a tower defense game, where you can place towers - in this case one base Monkey -, which can be upgraded to change its stats like shooting speed, to defeat rounds of enemies - in this case different bloon - that, if they make it to the end of the path, destroy your health until you lose :(. You start with 100 lives and 650 money to spend on towers and upgrades. The game is divided into separate rounds that increase in difficulty, although it levels off at the end due to the model I use to calculate the number of bloons and the lack of variety of bloons. The bloons are the Monkeys' natural enemy, threatening the fabric of Monkey Society by turning everything rubber and, as such, the Monkeys work to defend themselves from them.

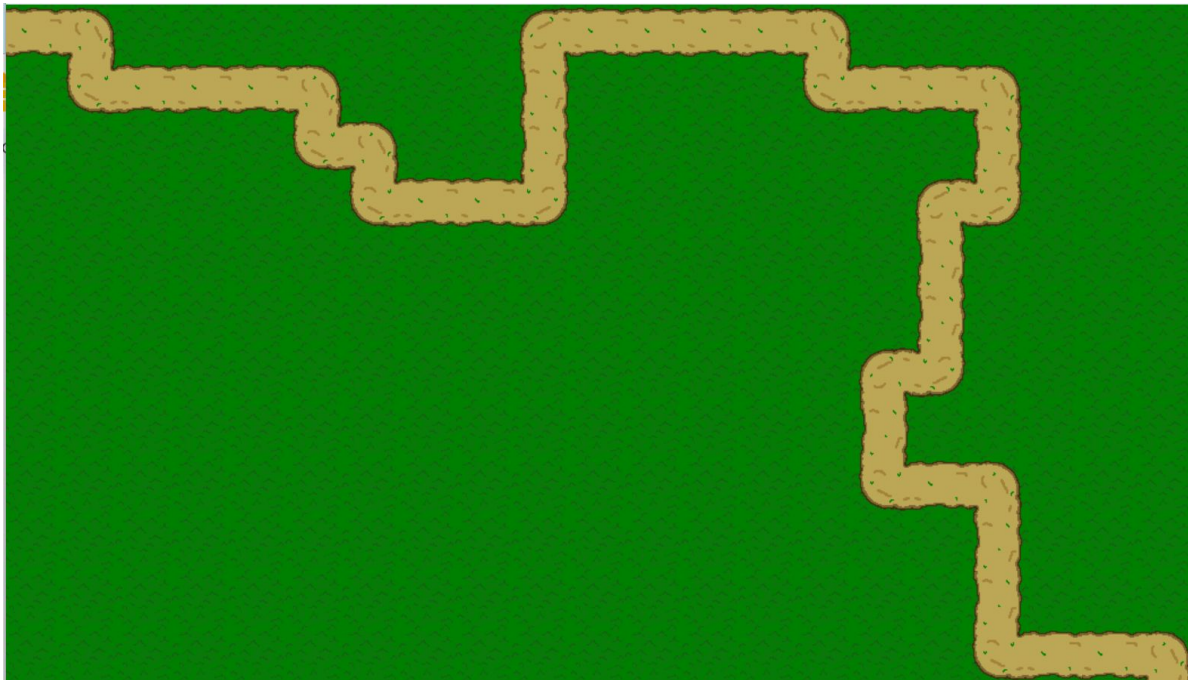
UI

When you start the game, you will see the board as well as light blue UI elements along the bottom and right side of the screen:



UI - The Board

The board is comprised of tiles, which are either given an actual direction or a direction of none. Depending on the direction and the previous tile's direction, the path and its image is made. If none, the image is that of grass. Only tiles with directions can the bloons traverse across. A grass path can be clicked such that, if the monkey selector button was pressed, a monkey is placed on the tile.



UI - Side Pane

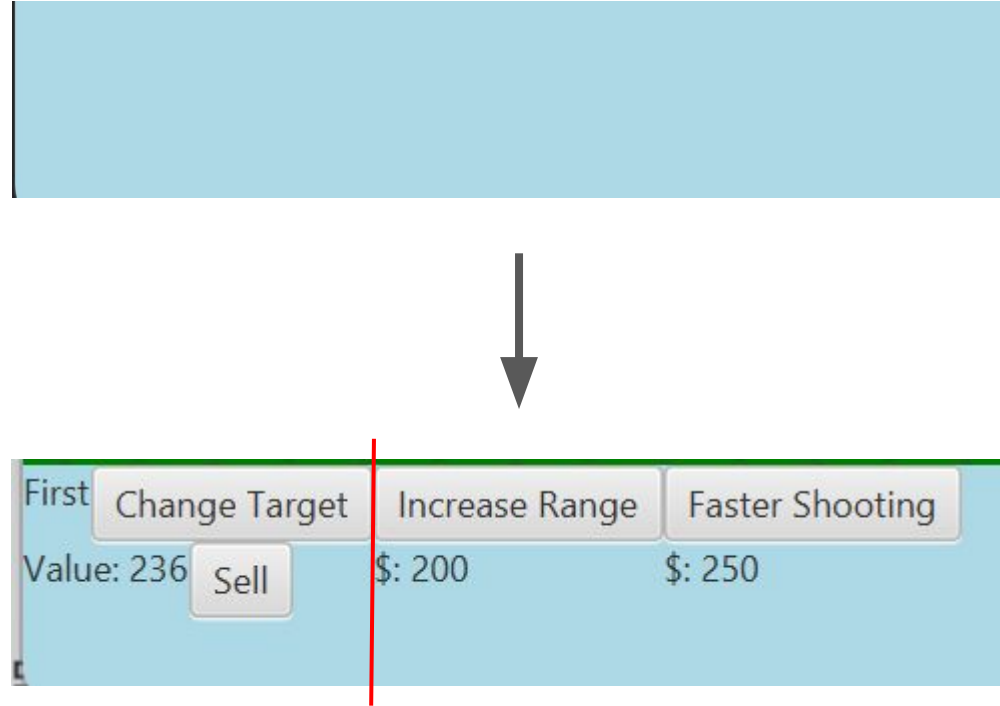
The side pane has information such as how many lives you have, what round you're at, and how much money you have. It also has a custom button to select a monkey to place down, which has its price listed in it. The buttons are intuitive, but note that start can only be pressed in between rounds, restart does not make a new board but rather keeps the path and resets everything, and on second press the fast forward returns to normal speed. On press, the Selector button is highlighted blue and if you click anywhere that isn't a viable tile, it gets unselected.

Monkey Selector
Button



UI - Bottom Pane

At first, and when no monkey on the board is selected, the bottom pane is blank. However, when a placed monkey is clicked on, it is selected and its information is shown on the bottom pane. On the left side of the line, it shows its current targetting system and a button to switch between systems. Below is the monkey's value when you sell it and the button to do so. The right side of the line shows the two next upgrade options and their costs.



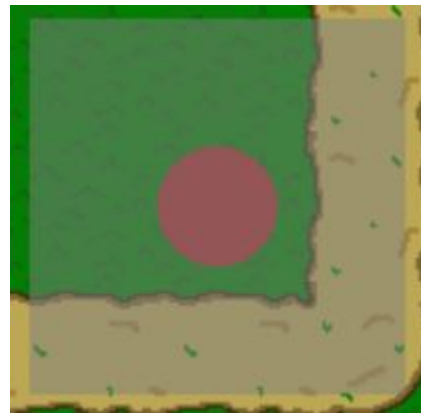
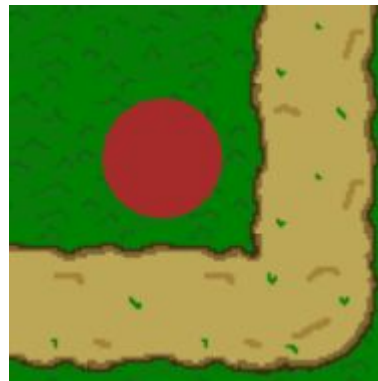
How to Play

The following pages go over the specifics of the different monkeys, bloons, and darts and how they all interact. Generally, monkeys can be upgraded to change their attributes and when bloons enter their range, the monkeys shoot darts that pop a layer of bloon when it hits one. There are multiple types of monkeys, bloons, and darts in my game with the types of monkeys and darts being tightly connected.

Some vocab: **Pop** refers to the number of layers a dart takes off a bloon on one hit and **Pierce** refers to the number of unique bloons a dart can hit before disappearing.

How to Play - Monkey

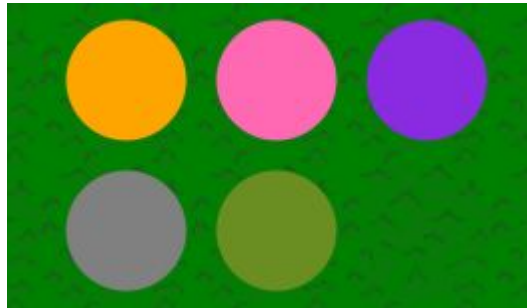
When placed, the monkey appears as a brown-red circle. The base monkey has a small range a relatively slow reload time. When clicked, the monkey becomes selected and the bottom pane is updated. The range of the monkey is also shown visually if selected by the semi-translucent rectangle. If bloons are within this range, the monkey can see them and will start to shoot based on its targeting. Monkeys have attributes like range, reload time, and the ability to see camo and hit lead.



Monkey - Types of Monkeys

In my game, there are 5 types of Monkeys, differentiated by how they shoot and their colors. There are **Seekers** (for upgrades *Apprentice* and *Glaive*), which are purple and shoot seeking darts, **BombTowers** (for the *BombTower* upgrade) which are gray and shoot frag bombs, **Snipers** (for the *Sniper* upgrade) which are camouflaged green and shoot bullets, **TripleShots** (for the *Multi Dart* and *Jack of All* upgrades) which are orange and shoot three darts at once, and **TackShooters** (for the *TackShooter* upgrade) which are pink and shoot eight darts at once

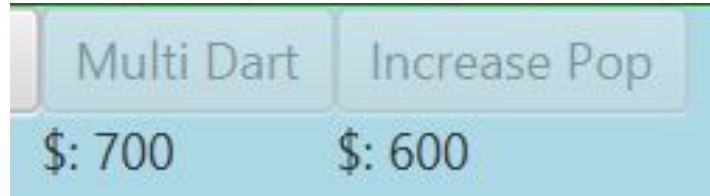
P.S. The different types of darts will be explained don't worry ^-^



The different types of monkeys, from left to right + top to bottom: TripleShot, TackShooter, Seeker, BombTower, and Sniper

Monkey - Upgrade

As previously mentioned, a selected monkey will show its possible upgrade paths. Additionally, an upgrade that is too expensive for the player cannot be bought.

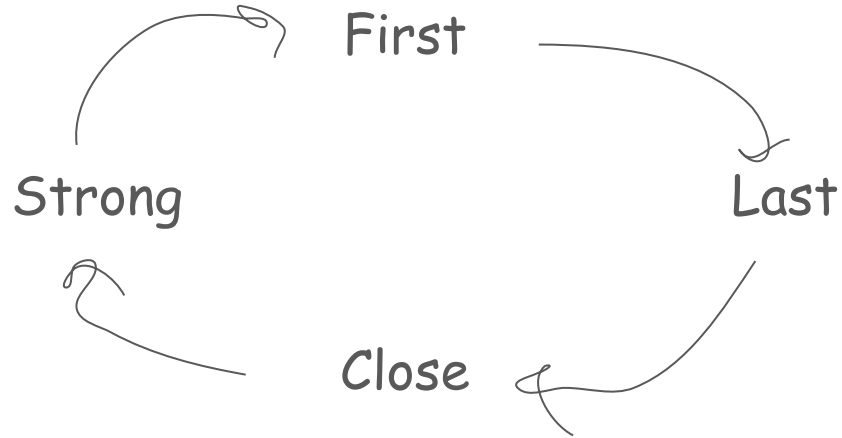


Monkey - Targeting

The monkeys have four different methods of targeting: first, last, close, and strong. Each monkey's targeting system can be changed independently of other monkeys. First targets the bloon that is in range and farthest in the track. Last targets the bloon that is the most behind in the range. Close targets the bloon visually closest to the monkey. Strong targets the bloon with the most health. For strong and close, ties in measurements go to the farthest ahead bloon.

Targeting - Cycle

Change target cycles through the different systems in the following way`



Monkey - Upgrades in Depth

Increase Range: Costs \$200 and increases the range by a multiplier of 1.5x.

Faster Shooting: Costs \$250 and decreases the reload time by .2 seconds.

Multi Dart: Costs \$700 and changes the monkey type to a TripleShot.

Increase Pop: Costs \$600 and makes darts pop 2 layers at once (ie. A blue would disappear instead of going to a red / pop = 2).

Increase Accuracy: Costs \$500 and makes the darts themselves 3x faster so they are more likely to hit their target, increases the range by a multiplier of 1.2x, and decrease the reload time by .2 seconds again.

Increase Pierce: Costs \$500 and makes the darts able to go through 3 different bloons in a row, but can't hit the child of a bloon that same dart already hit (pierce = 3).

Monkey - Upgrades in Depth

Tack Shooter!: Costs \$1500, makes the darts 1.5x faster, decreases reload time by .2 seconds, makes pop and pierce both 2, and replaces the triple shot type with a tackshooter type to shoot 8 darts.

Jack of All!: Costs \$1700. An allrounder triple shot monkey, with a reload time decreased by .35 seconds, a pierce of 2, and able to shoot lead and camo bloons. Full name is Jack of All Trades.

Bomb Tower!: Costs \$1500, has a pop of 3 and a reload time increased by .15 seconds, but able to hit lead bloons and replaces the monkey with a BombTower type.

Sniper!: Costs \$1700, has a pop of 4 and can hit lead but takes .3 seconds more to reload. The bullets are insanely fast so that they are less likely to miss since it also has range that covers the whole board (it is a sniper!). Replaces the monkey with a Sniper type.

Monkey - Upgrades in Depth

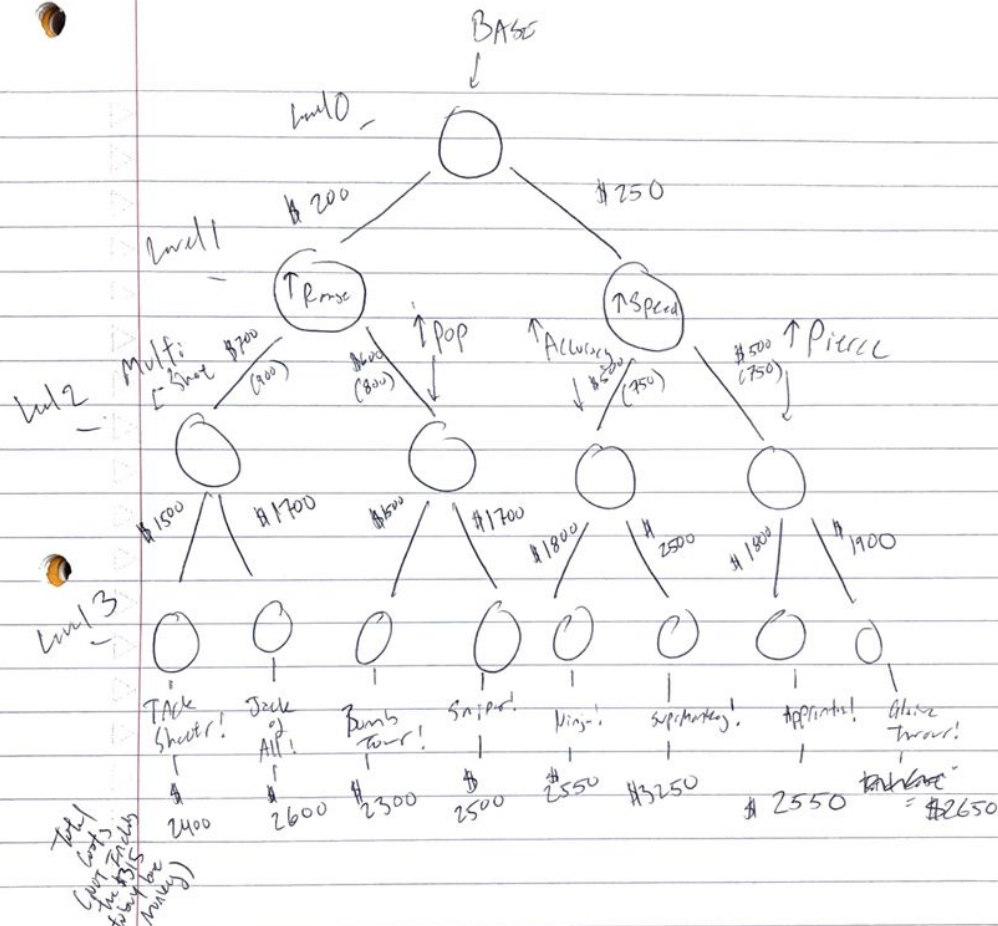
Ninja!: Costs \$1800, has a pop of 2, increased range by 1.15x, darts that are 1.5x faster, reloads .125 seconds faster, and can see camo bloons.

SuperMonkey!: Costs \$2500, has a range increased by 2.5x darts that are 1.5x faster, and reloads .325 seconds faster.

Apprentice!: Costs \$1800, has an increased range by 2.5x, seeking darts that are 1.8x faster, can hit lead and camo, and is replaced by the Seeker type monkey. However, only has a pop of 1.

Glaive Thrower!: Costs \$1900, can see camo, has an increased range by 1.15, seeking darts that are 1.3x faster with a pop of 2, but a reload time that is .1 seconds slower. Replaces the base monkey with a Seeker type.

Monkey - Upgrade Path



How to Play - Darts

Darts are how the monkeys are able to pop bloons. In my game, they are represented by black squares. The base dart pops through one layer of bloon and dies (pop and pierce = 1), but they change on the monkey's attributes. The darts are also given the attributes of hit lead and see camo from its parent monkey to determine what kinds of bloons they can hit. On a simple level if a dart hits a bloon that it *CAN* hit, the bloon gets popped. (unfortunately I am not adept enough to screenshot the moving dart while in game :(but imagine a javafx rectangle with length and width of 10px).

Darts - Types of Darts

There are 3 additional types of darts in the game that each have different interactions with bloons. There are **Seeking** darts that can only hit their target and, upon hit, they find the next closest bloon in the monkey's range and go target that one. They last until there are no more bloons in the monkey's range or if it hits a bloon that it cannot pop or is not its target. There are **FragBomb** darts that, when they hit the bloon, shoots out 6 tiny darts such that the degrees between them add up to 360. There are **Bullet** darts that can only hit their target and, when hitting a non-targeted bloon, goes through it, without popping it.

How to Play - Bloons

Bloons are the enemies of the monkeys, whose goal is to reach the end of the path. Each basic type of bloon has its own movement speed, health, and child bloon. When they reach the end of the path, the number of lives you have decreases by the leaked bloon's health. There are 7 normal types of bloons and 4 special case bloons that restricts if the bloon can be hit.

Bloons - Normal Types of Bloons

The weakest bloon is the Red bloon with health and speed of 1. Each parent bloon generally has one more health point and is faster than its child. The exceptions here are the Black and Lead bloons because they each have two children - black spawning in two pinks and lead spawning two blacks - so their health is twice of their child plus one. A recursive formula, then, can be calculated for health ($H(n) = k * H(n-1) + 1$ | k = number of children). Black and Lead bloons are also slower than their children.

Bloons - Normal Types of Bloons

The following diagram is the family tree of bloons:



Bloons - Special Types of Bloons

The 4 special types of bloons are: Lead, Black, Camo, and Regen. Leads and Blacks were already sort of covered, but their special interactions are that leads can only be hit by certain darts such that black bloons cannot be popped by those darts. Camo bloons need an upgrade to be both seen and hit (so that monkeys that can't see camos cannot hit them if their darts miss the actual target). Regen bloons, after a short amount of time regenerate their health until their current health is their max health (the original bloon type they initially spawned as).

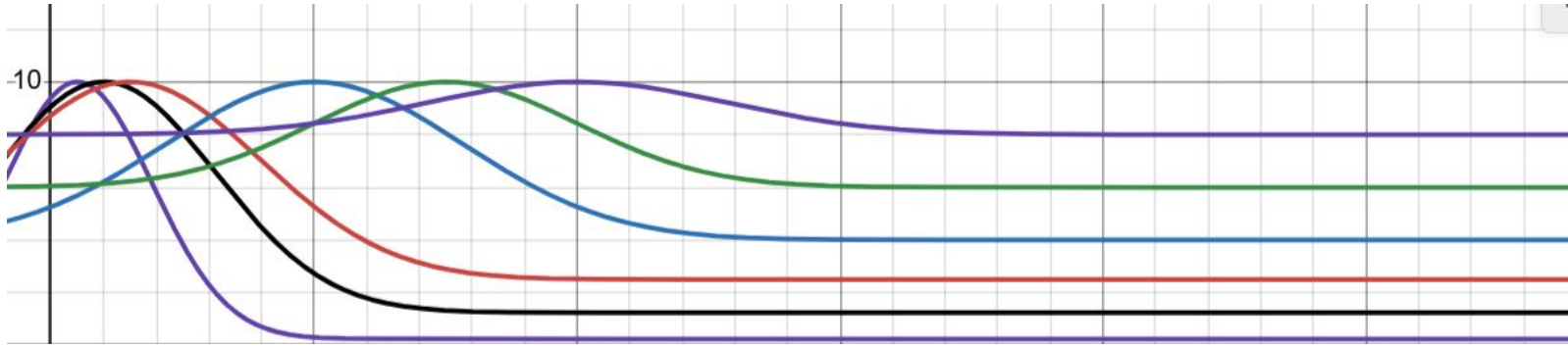


← Camo and Regen
Green Bloons →



Bloons - Spawning

The normal type of bloons have probability models that determines the probability of each bloon being spawned at a given round. The number of bloons per round is similarly randomized but slowly increase logarithmically. If you care, here are all of the bloon density functions:



FIN

I HOPE YOU ENJOY MY GAME!! THANK YOU SO MUCH FOR THIS CS15 SEMESTER. SORRY MY GAME KINDA SUCKS I WANTED TO DO SO MUCH MORE ;(

