

Game Title: Tanks Adventure

Backstory:

Robot technology has been developed at a rapid speed. Apart from video games, playing robot tanks has been becoming increasingly popular entertainment for young people. As a game tournament player, you need to control your robot tank, the “Red Comet” to shoot bullets and other weapons including machine guns and drones to kill enemy tanks and upgrade your robot tank to try to defeat more enemies on the field.

Characters:

Player:



The player could manipulate a new robot tank “Red Comet” to fight with enemies, it could use the main gun to fire penetrate and burning bullets, and use the machine gun and drones to kill enemies.

Enemies:



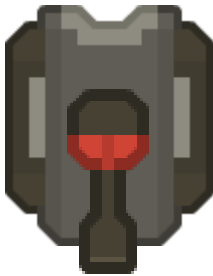
- Type 1: It has regular armour and shoots penetrating bullets toward the player.



- Type 2: it has weaker armour and shoots burning bullets toward the player.



- Type 3: it has stronger armour and shoots machine gun bullets toward the player at a rapid speed.



- Boss: it moves very slowly, and it has much better armour. It shoots burning bullets toward the player at a faster speed.

GamePlay:

Control keyboard buttons:

- Enter key or Left Shift: start or pause the game
- W or Up arrow key: go up on the map
- S or Down arrow key: go down on the map
- A or Left arrow key: go left on the map
- D or Right arrow key: go right on the map
- Space key: fire a cannon, that has a short period of “cooldown” time
- 1,2 or 3 key: switch between two types of ammo

Mouse:

- move the mouse on canvas to change the direction of the tank’s turret to try to aim at enemies.
- Submit button will add player’s nickname, current difficulty level and scores into the record
- Replay button will start a new game.

Gameplay Mechanics:

The player's tanks will be spawned at the center bottom of the game area. All types of enemies could be randomly spawned in the game area. The boss tank will be spawned when the player killed a certain amount of enemy tanks.

Once enemies are spawned, they will randomly move in up, down, left, and right directions and try to find the player. If there are no blocks in between the enemies and the player, then the enemy will start to move toward the player.

There are two values for each tank in the game.

- Health points: automatically get recreated, get decreased if the tank is hit by bullets. If the health points are lower than 0, it will be exploded.
- Armour: could defend a portion of damage from other tanks depending on the ammo type and the angle between the ammo and the tank's body.

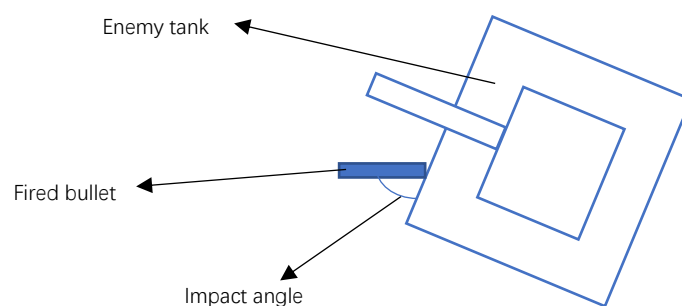
	Player	Type 1	Type 2	Type 3	Boss
Health points	100	$10+10*\text{level}$	$10+10*\text{level}$	$10+10*\text{level}$	$20+10*\text{level}$
Armour	10	10	6	12	14
Speed	2	2	2	2	1
Ammo	Both	Penetrating ammo	Burning ammo	Machine gun ammo	Burning ammo
Ammo Damage	P:10 E:20	$8 + 2 * \text{level}$	$14 + 2 * \text{level}$	$4 + \text{level}$	$8 + 4 * \text{level}$
Ammo Penetration	P:20 E:6	20	6	6	12
Reload Time	60	100	100	30	50

(P for Piercer bullet and E for Explosive bullet)

There are three types of ammo in this game:

- Penetrating ammo: it has a higher penetration value to penetrate more armour, and deal lower damage, the player is able to make critical hits with higher damages.
- Burning ammo: it has a lower penetration value but may deal more damage, the player may deal burning damage over time.
- Machine gun: it has a lower penetration value and lower damage, but it shoots faster than the other two types of ammo. The player is able to shoot at least 10 machine gun bullets in a quite short time.

If the impact angle is higher, the damage may be higher. The bullet will deal the maximum value of damage if the ammo is perpendicular to the impact side of the tanks.



The final damage formula is

$$\text{Final damage} = \text{bullet damage} - \text{armour} / (\cos\left(\left|\frac{\pi}{2} - \text{impact angle}\right|\right))$$

When an enemy is killed by the player, a loot box will be generated on the ground, when the player reaches the loot box, the player will obtain some health recreation and coins.

	Type 1	Type 2	Type 3	Boss
Recreation health points	10	10	10	20
Coins	5-10	5-10	5-10	10-20



All upgrade options and cost of coins in the game. If a boss is killed, instead of awarding coins, the player has a chance to get one of the above upgrades without coins.

Rules for Game & Victory Conditions

The player has 2 extra life, when the health points are equal to or lower than 0, then it cost 1 extra life and the player will recover all health points and an 'invincible' shield that block all damages for a short period of time. When the health points are equal to or lower than 0 and there is no extra life anymore, the game will be ended.

Game world:

The game world is a scrolling tournament. The player stays at the bottom of the canvas, when the player reaches the $\frac{2}{3}$ height of the canvas, the canvas will be scrolling up(everything except the player's tank will move down on the canvas).

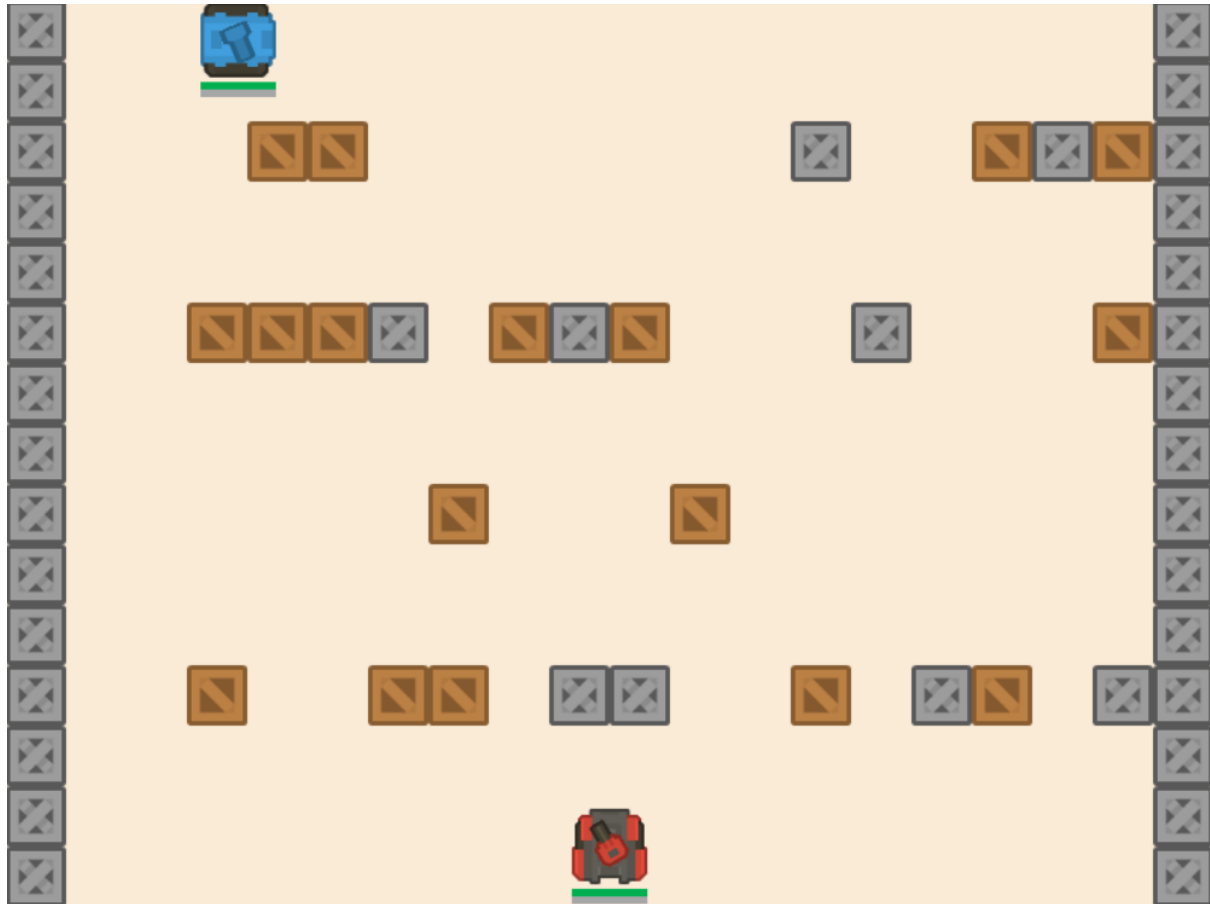


Figure 1: game interface

The tournament area consists of two types of blocks, one is concrete and the other is wood. The wood brick could be destroyed by a tank's bullet and concrete bricks can not be destroyed. Both bricks are randomly generated on the canvas. The enemies will detect the player whenever no block in between them, then aim and shoot the player.

Bonus Materials:

The highest scores will be recorded in the game to encourage players to replay the game. The top 10 players with the highest scores will be revealed in the record table after players added their scores to the records.

Reference:



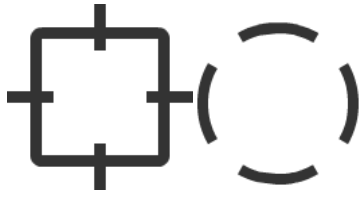
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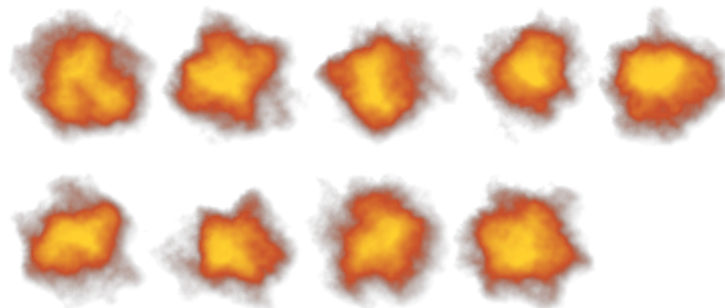
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