The Battletread Tank & Tank Behavior

The Battle are the various mean monstrous tanks roaming the streets and often mini-bosses gating off progression. These machines are our "Big Daddies". Tough large enemies built in-game around the concept of the player having to use their platforming ability to move to positions best for damaging the tanks in their sides, back and top. It is up to player skill to avoid the powerful tank attacks and find the opportunity to strike within the chaos.

By utilizing the environment and the complex enemy design, what we can possibly achieve is an innovative experience with monstrous steel enemies. A true new concept which Ballistic Mystic should treasuly aim to create. This section shall break down the important interactions & essentials to the behavior of these enemies.

Tank Art Assets

To properly render the exaggerated motions and actions of the tank we would need to set the tank into sections. These pieces are separated into Turret, Hull and Tracks. By isolating these parts we can provide control to the visual assets as needed. The turret and its animations as it fires, swings its barrel, and reloads. Turrets should be rigged with a base and barrel joint system which from there designers can have the base to yaw and the barrel pitch towards the target. Any animations related to reloading and firing should be connected to the proper joint. The hull being affected by recoil of firing main weapon, hit confirmation and movement, giving a sense of weight and inertia. Tracks are the trunk of this tree of assets, with minor effects for when the tank is jumping, landing and being hit.

Battletread Object Hierarchy
- Tank Object (?) - Primary prefab root of whole tank unit
  - Hull (!)- Main body which is affected by physics and animation to portray weight
    - Turret(!) - Root/base of the main gun system, the yaw axis aim
      - Gun (!) - the barrel which is affected by pitch axis aim, animation for fire recoil and reloading are within this breach
      - Gunner (?!) - extra position on turret for a machine gunner
  - Tracks (?) - section for animating the caterpillar track links

Tank Movement Behavior Pieces

Essential pieces required for tooling tank movement behavior. Editable tools for stage traversal and combat design.
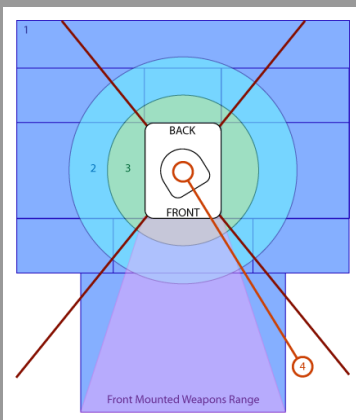
1. Tank Sensory Zones
-Zones for identifying player position around tank
-Designer adjustable zones for difficulty
2. Anti-personnel Zone
-Use if grenades and aggressive close range weaponry
3. Wall Collision Sensory
-Space to stop tank from colliding with wall
-Also keep track of the environment that players can use against tanks.
4. Player Distance Tracker
-Raytrace measurement to track when the tank needs to move away from the player.

- Player Spotted Position Marker
  - As the player is within tank behavior collision boxes, this marker shall target their location.
  - Markers don't work outside tank behavior tools, if player leaves box that is the last marked location
  - Used to mark last known position of player
- Battlefield Waypoints
  - Use for when tank needs to position to attack or flee from player
- Platform Collision types and labels
  - For use of signaling to avoid or destroy certain platforms
- What ground the tank is traveling on
  - For use for the tank to recognize what platform it is on in reference to the player and if it should jump or travel to another location.
- Player detection collision boxes
  - these collision boxes on the front, sides and back.
  - Should be adjustable in size for development of difficulty.
  - Tank needs to prefer to have the player in the front collision box when it decides to turn towards the player.
- Wall and platform detection, raytrace and collision boxes
  - Able to know when its rear is turned towards wall
  - Needs to know when close to platforms
  - When tank decides to check for walls and platforms it should move away to protect itself or not corner its weak point in an unfair fashion
- Raytrace player location
  - To measure distance of player
  - Measure line of sight to player
  - Used to recognize what weapons to use
  - If player is in close proximity within set, internal tank should take action to attack with close range weapons or evade player by driving to set waypoints
- Player height from tank detection, is player on top of tank collison box
  - Used to recognize if top of tank is in danger
  - If player is close and in air near tank, tank can activite anti-air attacks like balloon mines and electrify the hull

Tank Behavior Goals

Like any enemy the tank has to aim to defeat the player but there are some rules we need to set in order to have the experience battling these steel monsters feel awesome and especially fair.

When in confrontation with a tank we want the player to move around and work towards attacking the sides, top and back. Having the Top and back as the best targets for damage.

The tank's job is to keep itself at prefered distances, locations and facing towards the player. To enforce these movements. We'll need to map nav points and assemble raytrace and collision fields for information. The tank must know where it is positioned on the game field and the location of the player in relation to itself. This information should then alter the behavior in intervals as though the tank command is giving pause as it decides its actions.

Tank abilities should be measured by timer or a kind of stamina bar. So that tank attacks can't simply overwhelm the player too quickly. We would also need developer tools to enable releasing timer limits to attacks as the tank receives damage, to increase difficulty of prolonged battles.

Tank actions' effective reaction also depends on "commander" settings. It is best to describe the commander as check intervals, where actions would influence a timer that marks check intervals. When a check is performed the tank is locating the player. From locating the player the tank should then decide an action. Also if the tank should interrupt an action when threat levels have changed.

Tanks must be able to repel players from close encounters. We have to provide our tanks with overwhelming means to push back the player. We can't have them simply run up and jump around our tanks and have them look stupid. To counteract player platforming and up close attacks we'll need to have an aggressive set of movement and varied attacks when in close proximity to the player. Different types of attacks for various distances and also the blast of the cannon able to push players away with a gust of cannon pressure waves.

Tank AI Behavior

Tank functions, instructions, and tools involved with the main primary weaponry and movement of the tank. Through the formation of these tacks we can use them in separate pieces for other possible enemies like pill boxes, armored train cars, turret emplacements, and so on.

Tank task listing
- Locating player character with use of the tank tools
- Decide to sit "at rest" when safe distance or safe in general
- Decide to move towards or away from player, depending on distance and location parameters of weapon or if feeling endangered or safe
- Queue of attacks
- Deciding the urgency of actions depending on player's proximity, tank location, and tank's integrity
- Fire secondary weapons when the player is in the appropriate location: rockets, mines, artillery, machine gun ports, magic projectiles, anti-personnel, smoke, etc.
- Deciding target location to move to in case of fleeing or finding firing position
- Recognize projectile types flying at tank and which facing of tank
- Decide to dodge dangerous projectiles, when able
- Detecting where player is when receiving damage

Gunning Tasks
- Turret yaw and barrel pitch tracking player, when alerted to player presence
- Turret leading shots for cannon fire, usually higher difficulty
- Firing of main cannon
- Firing of turret machine gun
- Firing of front gun port or other gun ports
- Reload main cannon

Driving Tasks
- Turning and facing the tank when threatened
- Driving the tank into offensive or defensive positions
- Moving & turning tank for the gunner to aim quicker
- Rest tank when feeling safe or firing main cannon quickly
- Flee tank when threatened
- Aggressive maneuvers when hit by attacks, turning rapidly, driving backwards to way point location
- Drive slowly when main cannon is aiming or firing

Turret, Hull & Tracks

Movement and Attacking are two specific events. Movement while attacking is another specific event but ultimately want our main turret, the primary weapon of our tanks, and the hull, our primary defence and movement, to be separate.

Main focus of the hull is to decide when to stop and move often this should be instructed by the main AI, (commander). The movements in response to player position and if turret is attacking. If the turret, (gunner), is attacking it needs to announce/ flag to the hull (driver), that it is doing so. Primary attacking should instruct the "driver" to slow down to convey that the tank is trying to be steady. When the "commander" instructs an attack movement combination the team should cease normal function and follow instructions for the event to pass.

Turret Behavior

Turret has multiple tasks in relation to firing. Turret turning rate in aiming at the target. Turret rate of fire is reduced while the tank is in motion. The amount of time it is on target before firing. How much lead in aiming at the target. How many shots before playing reload animation, the reload animation for the purpose of revealing a bonus damage opportunity. And finally able to utilize the tank turning to increase turret turning speed to follow the target.

Tank Fleeing, Attacking and Positioning

Often our tanks have to move around the battlefield. Often this is away from the player. The problem is if they move forward towards their destination they'll present their weak rear. In the case of easier tanks this is fine, but for our meaner and tougher challenges they must know how to drive backwards.

Which in lies the other problem, we can not have tanks move too fast backwards but we need to be able to defend their escape. So we have to have aggression in control when it comes to speed. When tanks are attacking with main cannon they have to slow their speed. Firing while moving is possible but not too high of speeds. We may want to be loose with this rule when it comes to lighter tanks made with speed in mind.

When fleeing from a player we want our tanks to throw many grenades or whatever is at their disposal to distract the player while it's able to turn and drive away.

When hitting a position at a prefered distance the tank's attacks should be able to fire at a strong pace. Players would want to get closer to a medium range to have the tank move in order to attack with its main cannon. Moving in close range is a risk reward effort where anti-personnel grenades and even magic can pour down on the player. When enough intervals have passed in close range the tank should decide to reposition.

Tank Dodging and Jumping

These tanks are not normal tanks we know in the real world. These ones do outrageous things like being able to jump. These actions are for moving from one ground plane to another, trying to trample/stomp the player or avoiding damage from player attacks.

Dodging is in the form of forward and backwards dashes and side rolling somersaults! The tank has to recognize which side it is being fired upon and avoid the associated action. If an RPG by a player is spotted fired/flying at the tank's side the tank can dash forward or back, maybe even jump. If shot from the front or rear it shall roll if able.

Jumping can be used to move from one platform to another, or to close/open distance to a player. The jump is one of the more ridiculous of tools for tanks to move to different platforms for better firing positions, give chase and gain equal ground with the player if able.

Tank Aggressive Retaliation

When the player is in close or even on top of our tanks, they would need options to move away or bat the player away. These can be in forms of for instance literally using the turret barrel to bat the player off the hull, electrifying the hull, making wild turns in position to throw the player off, or dashing away right from under the player's feet. Other options include rolling

Roadkill (?)

Tanks we have to remember are vehicles. They're capable of fast moving and colliding with things and even the player. This concept here is the fact that it should be dangerous to try to run up to a tank. It can just decide to run you down given the chance. The battletread tank moving around quickly could easily be used to push players away. So things like the tank's dashing and rolling are capable attacks against the player.
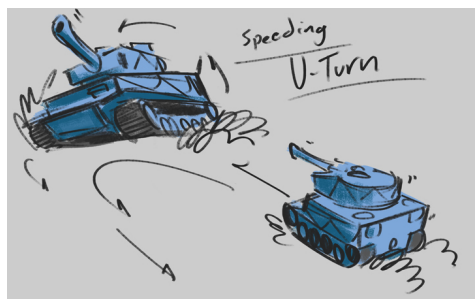
Special Movement & Turning
Fleeing and repositioning is two different actions but how they do these actions can share the movement patterns. Peeling out away and then drift U-turn is one method for example of these movements.
Youtube reference, yay!
https://www.youtube.com/watch?v=tXl42vbzaqE

Hit confirmation

When hitting the various sides and top of the tank we need to convey if damage is getting through with proper feedback and weight to the tank. When hitting the heaviest armored parts we need to show sparks and ricochets, and the hull holds firm with little to no impact. Rounds hitting lesser sides should canvey piercing through the steel, visually showing a pop and smoke and the hull should wiggle in response. More intense hits like rifle to the rear, open weak points, or rifle grenades give off nice friy explosive shakes.

Upon a death blow, we would like the large explosion extend towards the opposite direction of the initial hit, to convey a sort of entry and exit damage.

Area & Platform Mapping/labeling

Navigation around the game field from one platform to the other has to be clear as to which platform/ ground is the tank traveling on. Is the player on a platform which the tank can reach? Can it drive around or simply jump to the locations. Is the platform dangerous to be parked near? Can the platform the player is on destructible? It is more than waypoints we need to consider when developing the tank's travel environment. Being able to mark which platforms to avoid when damaged and which to destroy can make for an dynamic use of the same environment.

Structural Weak Points

Spots on the tank that the player can rifle aim to cause major damage. For example, the driver viewport is in front of the tank but the front is often the most dangerous to stand in place because of the front mounted gun.

Animation Goals

Tanks have to be expressive with its turrets and overall weight. The tanks have to swing tilting and motioning its hull around as it drives. Move forward from stop, the barrel and hull feels a slight lag behind the tracks which are leading the bulk of the tank. When it comes to moving the tank around it's all about expressing its heavy weight.

Turrets are much more complex. They have different reload actions and firing mechanisms. In asset production we have to keep in mind that we need to have the base and barrel influenced by the target. So animations regarding reloading and firing have to be on the barrel branch of joints if the mechanical design needs it.

The first turret for the demo, the toggle action, is a lever based system that has the arm pop up upward opening the chamber to eject the shell cartridge. Firing has the barrel recoil along with the toggle arm opening the chamber. When reloading, it'll stop the arm in an open position and hold there as a new set of shells is positioned in the chamber.