Mechanisms of Destruction
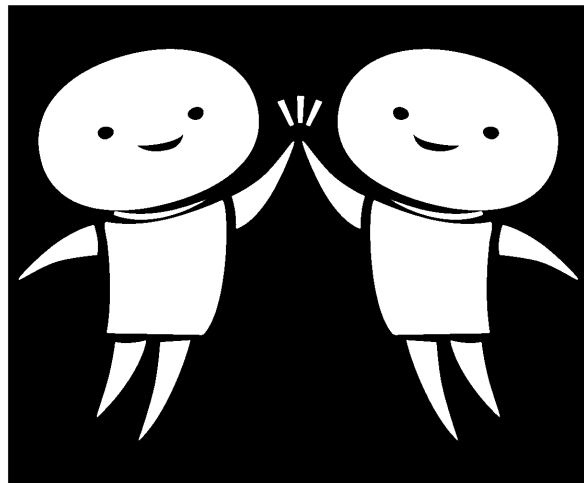
CSE 5912: Capstone Design: Game Design and Development

Spring 2019

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Game Overview

Mechanisms of Destruction (MoD) is a multiplayer vehicle-based combat game in which a player controls a tank or mech with multiple systems and weapons, each of which provide distinct advantage to the player. Combat occurs on several maps in which players must destroy any enemy player mechs. Players must manage movement and weapons by switching between the different perspectives for each system.

Gameplay

Mechanisms of Destruction is network multiplayer. One player acts as the host and creates a lobby which other players can connect to. Once all players mark themselves as ready, they are loaded into the selected map and spawned at randomized locations. Gameplay proceeds in rounds. In each round, players fight in a free-for-all until only one mech remains. Players are awarded points for destroying other mechs, and must spectate the remainder of the round if their own mech is destroyed. After a set amount of rounds (currently 3), the player with the most points is declared the victor.
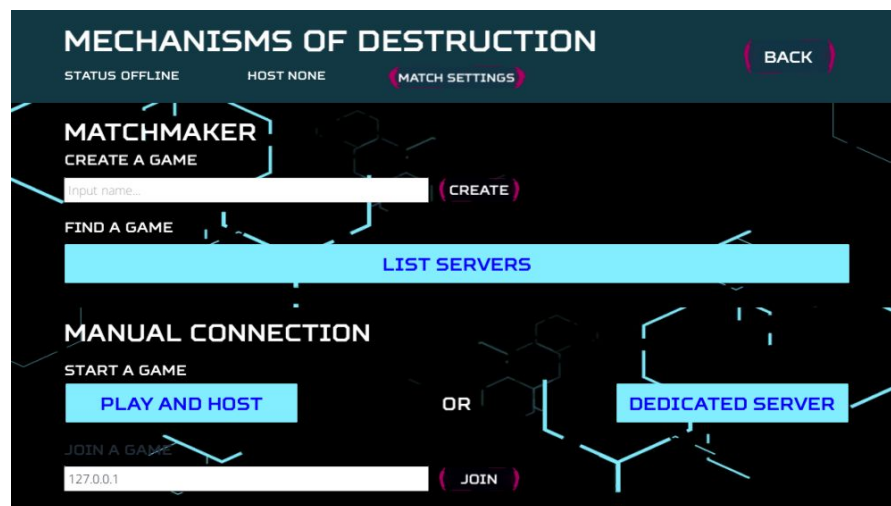

Figure 1: Networking Lobby System

Inspiration

Mechanisms of Destruction is inspired by several games, including FTL: Faster Than Light (Subset Games), and Guns of Icarus (Muse Games). Particular elements of inspiration from FTL include the idea of configuring a vehicle with customizable modules

that provide various functions or influence the vehicle's properties, such as weapons systems, shielding, engines, and so forth. Some ideas considered from Guns of Icarus include switching between operating several aspects of a vehicle in first person, in a real-time 3D environment; additionally, an individual player can only control one aspect of the vehicle at a time, such as piloting, firing a weapon, or repairing some component. Additionally, weapons have limited range of motion and can fire only at enemies on the side of the vehicle where the weapon is mounted. The idea of needing to triage what a player focuses their time on during combat has provided significant design inspiration to this game.

State Diagram
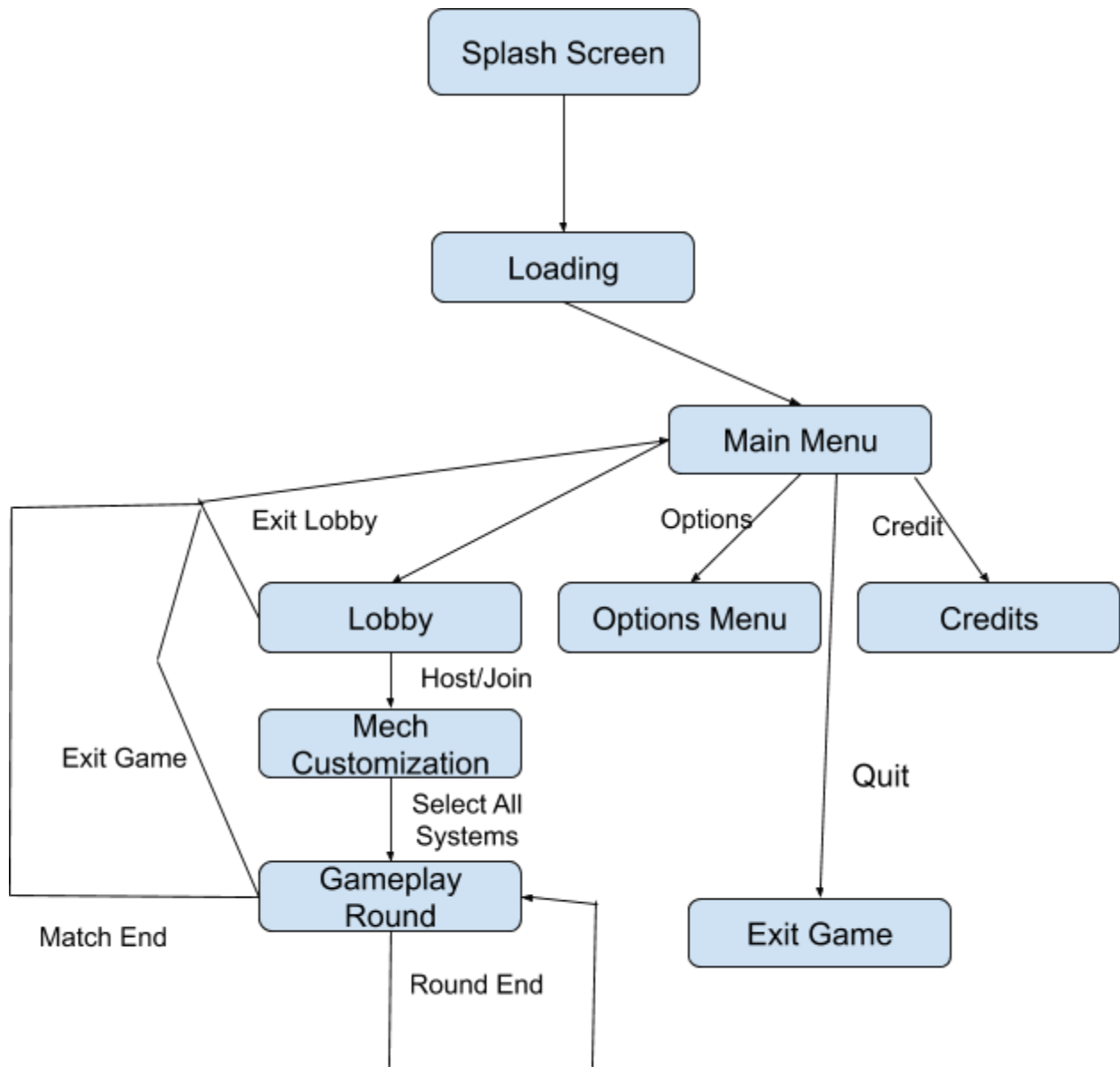
Game Features

Input

MoD uses the Unity Input Manager for input. Due to the complexity of vehicle operation, input via controller has been found to be impractical.

Command	Keyboard/Mouse Controls
Switch to perspective #	Corresponding number-row key
Fire weapon	Left mouse button
Move forward/increase speed	W or Up arrow
Move backward/increase speed	S or Down arrow
Turn left	A or Left arrow
Turn right	D or Right arrow
Straighten course	Left shift
Pause menu	Escape
Scoreboard	Tab
Activate barrier	F
Lay mine	Left mouse button

Perspectives

Most systems that can be added to a mech have a perspective, which includes both camera position and a set of allowed controls. For example, when the player is in the navigation perspective, they can control mech movement, but cannot fire weapons. Players must cycle through perspectives during a match to operate their vehicle's movement, shoot at enemy mechs to destroy it, and pursue other gameplay goals.

Figure 2: UI for switching perspectives

Movement

When moving, vehicles will always either advance in the direction they are facing or reverse in the opposite direction. To influence vehicle movement, players will use directional inputs to set their velocity and turning angle. Forward and backward directional inputs will adjust a player's velocity incrementally. The mech continues to move based on the last inputs set, i.e. if moving directly forward at full speed, it will continue to do so while the player switches to another perspective and is operating other systems of the mech.

Left and right directional inputs set how sharply a vehicle is turning while moving. The player may also instantly reset the vehicle's turning angle to directly forward or backward.
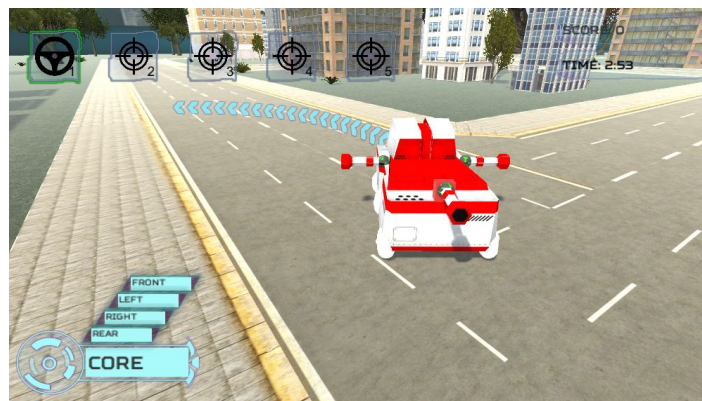

Figure 3: Movement with predictive arrow indicator

Weapons

Weapons occupy a system slot on a mech, and must be operated individually. Mechs will have a limited amount of slots that players can put weapons. Each weapon's field of view will be limited based on its placement on the mech, i.e. a weapon in the left slot will only be able to aim, generally, to the left.

Machine Gun

The machine gun is a hitscan weapon, and can be used like weapons in many first person shooters. Its field of view is limited to the side of the mech it is placed on. A maximum range limit prevents unreasonably long-distance engagement.

Artillery

The artillery weapon fires a projectile that is affected by gravity and explodes on impact, dealing damage in an area of effect. While the perspective is being used, it displays an arc predicting the projectile's path to assist with aiming. Additionally, it can destroy buildings in the city map.
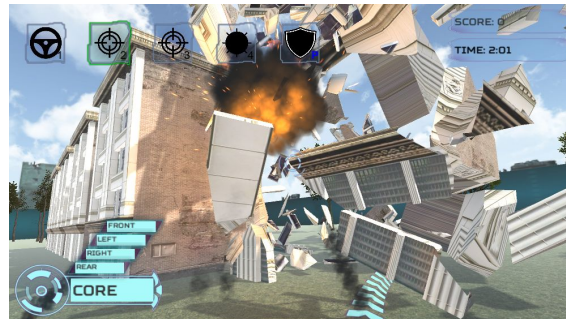

Figure 4: Artillery destroying a building

Minelayer

When using the minelayer perspective, clicking the left mouse button drops a mine to the ground directly below the system on the mech. Mines take two seconds to arm themselves, and then will damage any mech that drives over it, including the player who placed it. Mines can also be triggered by shooting them with the other weapons.

Figure 5: Mines deployed on the ground

Additional Systems

Non-weapon systems provide some additional utility to the mech, and similarly occupy slots, but may or may not have a perspective associated with them. These systems are limited to being placed on the rear slot, so players can only choose one of the options.

Barrier

The barrier system is a shield that prevents the player from taking damage. When activated, a blue sphere envelops the player's mech, and this indicates that the player is invulnerable. The effect lasts two seconds, and has a fairly long cooldown.
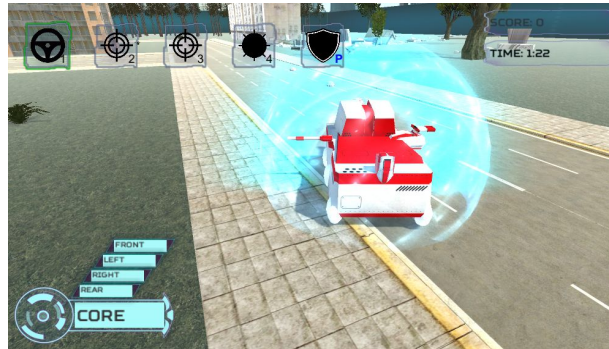

Figure 6: Mech with shield barrier activated

Repair

The repair module has its own perspective, and is used to repair other damaged systems that have not yet been destroyed. In the repair perspective, clicking and dragging with the left mouse button rotates the camera around the mech, and right clicking on the mech repairs that system. Systems that have already been destroyed cannot be repaired.
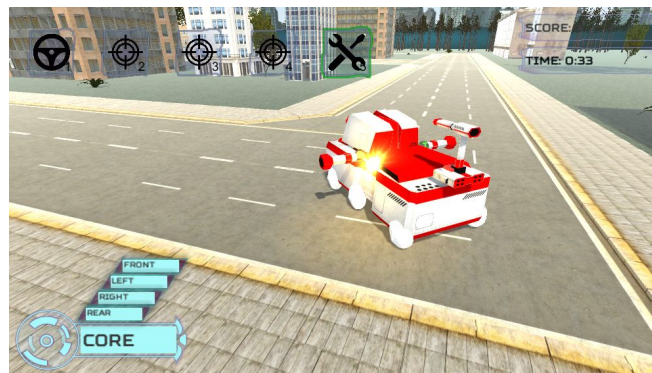

Figure 7: Mech being repaired

Jump

The anti-gravity system is a jump mechanic activated by pressing space. This propels the player's vehicle forward through the air a significant distance, and has a fairly short cooldown.

Mech Customization

Upon entering a match, the player is presented with a customization menu. For each slot, the player is shown a list of available systems, and may select one. Upon selection a system for each slot, the player may begin to play.
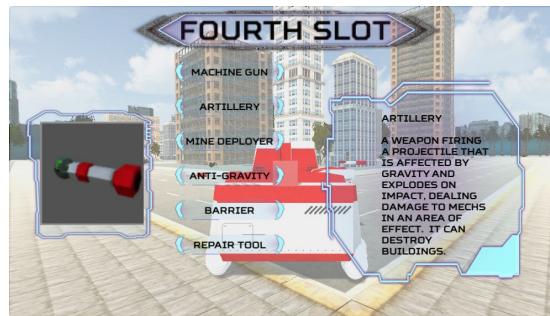

Figure 8: The final stage of mech customization with a weapon highlighted

Mech Destruction

The mech has an amount of HP, and each system mounted on it has HP as well. The mech has a large hitbox for each system slot; when damage is taken on that hitbox, the system is damaged. Once the system health is reduced to zero, the mech may take core damage if that system's hitbox takes further damage. Once core HP is reduced to zero, the mech is destroyed.

Figure 9: The health bars for the mech

Environment

There will be multiple maps for players to battle on. Destructible objects will remain destroyed in the scene, affecting the terrain and players' strategic choices.

City Scene

This scene features a city with various buildings on a road grid. Large buildings are destructible when hit with the artillery weapon, and fracture into large pieces that provide additional tactical opportunities. This map is relatively small, and does not feature procedural generation, allowing players to find each other more quickly and adapt their strategy to predictable features of the scene.

Moon Scene

This scene features scifi-themed buildings on a procedurally generated lunar surface; each new match will generate a new surface and place structures in a new configuration. In contrast to the city scene, there may be significant elevation variation of the map surface, providing an opportunity for a distinct gameplay style. A large dome limits the play space, while still remaining larger than the city scene. Spawn platforms are placed around the outer edge of the area.
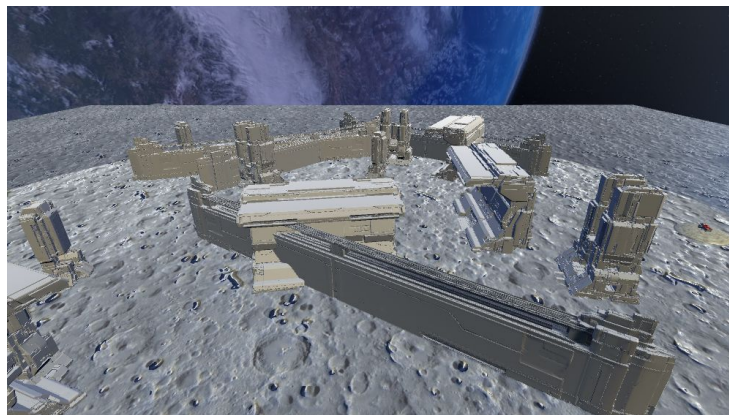

Figure 10: The moon scene with buildings