

Staffordshire University

School of Digital, Technologies and Arts

Computer Games Design Level 6 Bachelors

Individual Games Technology Project (GAME60193): Critical Combatants

Research & Development Report

Character Action/Hack and Slash Technical Demonstration

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Contents

- Contents2
- 1. Introduction.....3
- 2. Process3
 - 2.1 Sub Heading 14
 - 2.1 Sub Heading 2.....10
- 3. Conclusions..... 15
- 4. Moving Forward 15
- 5. Appendix..... 16
- 6. References..... 16

1. Introduction

The final deliverable of this project would be to have an in-depth free flow combat system inspired by the *Devil May Cry* and *Bayonetta* franchise. With fully integrated animations, effects and mechanics that can interact with world space, props, and NPCs. The project's one linear level will be designed to complement the game's combat progression by railroading the player through 3 to 4 combat encounters equally divided across the level. Each combat encounter progressively introducing more complexity by increasing the number and variety of enemy AI combatants.

To reach that goal with the RnD report, I've broken down development into five parts:

- **Mechanic Research and References:** Play the inspired games, breakdown their gameplay loop, mechanics and reference what influence it will have on the project.
- **Visual Research and References:** Search for appropriate visuals assets and animations, by the criteria of the planned narrative and what fits the tone of the high action game.
- **Prototyping the Core Combat:** Simplify the combat chains down to numbered variables, with one single linear chain of commands simulating the most basic of attack execution. Also experiment with contextual input reads, such as '(Move-stick-down) + (attack)' which will interrupt the current chain and skip to a special value which executes that specific attack. Think of super simplistic version of this: "[Bayonetta Moves Combos 3 - YouTube](#)"
- **Implementation of Animations:** Animations are synced to the numerical values that represent the order of actions and what specific input the player tried.
- **Initial Level Blockout:** The level will be prototyped and built in a linear way that focuses on getting the player to the action set pieces at an appropriate pace.

2. Process

Conducted Research

Before prototyping the project, I need to play the inspired games as to get a sense of reference to how my game should play by comparison. The game should not be a direct copy of its contemporaries of course but play similarly enough to where if someone picks up the controller and plays, they will subconsciously compare it to similar games. Like how someone who plays *Halo* can recognise the similarities and differences of its gameplay to *Destiny*.

For reference, I played a couple levels of *Devil May Cry 4*. In that single play session, I tried to visualise my game and its mechanics using honour ruling; allowing only the use of a single offensive tool, neither could I use support tools to close the gap between me and enemies. Dumbing the rules of the game, was to simulate my game in another by artificially removing its complexity to more manageable elements. Using only the character's sword attacks, helped to picture my player character using their sword weapon to perform similar attack. I only plan for one modular weapon to be able to be used by the player, until I can be sure I can add more. Below is a link to that original gameplay demonstration I recorded. And after that I began my development on the project's combat system.

Character Action Game Research - Semester 1 Final Year (Devil May Cry 4) Red Queen Only - YouTube

That was the first major play session and research, after that I played through the game and others similar such as *Bayonetta* for gameplay and level progression reference. Proper gameplay and mechanics breakdown will be shown later.

Character Action Research - Semester 1 Final Year (Devil May Cry 4) Full Moveset 2 - YouTube
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Character Action Game Research - Semester 1 Final Year (Bayonetta 1) - YouTube
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2.1 Early Combat System Iteration

Attack String Development

[CC Print string Combat Concept Showcase - YouTube](#)

This video demonstrates the earliest version of my combat system using print strings. This early system is my first test with enumeration, the player has one string for both ground and air combat, that switches dynamically whenever the player jumps or lands. Ground attacks give a small amount of impulse to fake the player moving forward, movement is also disabled briefly to stop the player from running while attacking.

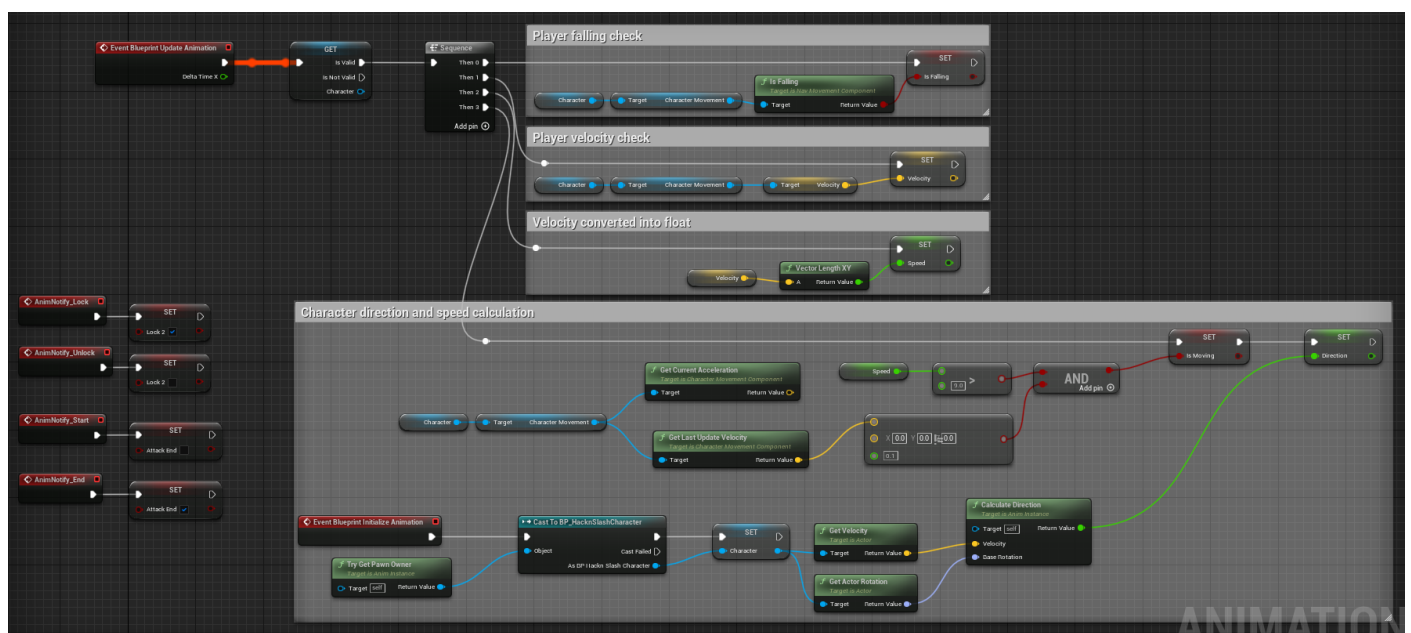
The pause in the air is my attempt to copy *Devil May Cry* air style combat. Whenever the player does jump or begin falling, they will be checked with an 'Airborne' Boolean that enables air combat. While the check is in place, all attack inputs performed in the air will lower the playing gravity and impulse them slightly upwards, keeping them suspended.

Traversal Animations

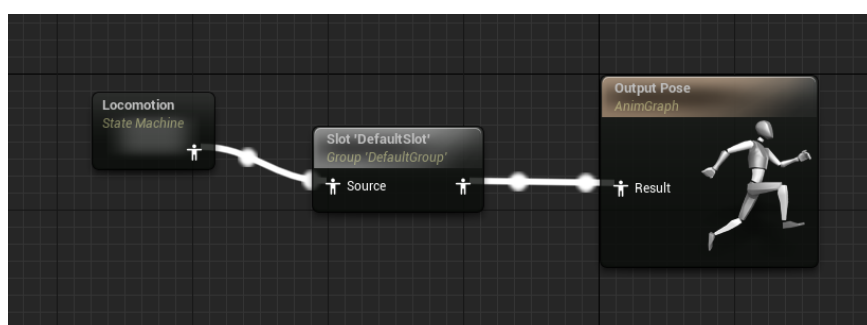
The animations for my project come from the 'Sword Animation Pack' shown later in the document. This has been my first big venture using animations in a project and it has been an interesting process, it took a long time for me to figure out the 3D Blendspace, but I managed to visualise it with my own custom-made graph below the showcase image. Despite the struggle, the experience has been key to help me plan out future visual development of the combat system.

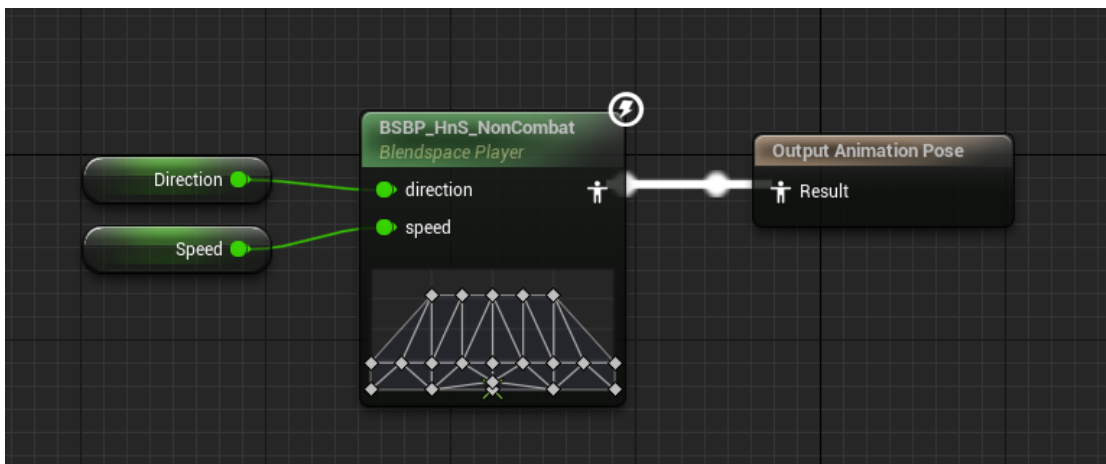
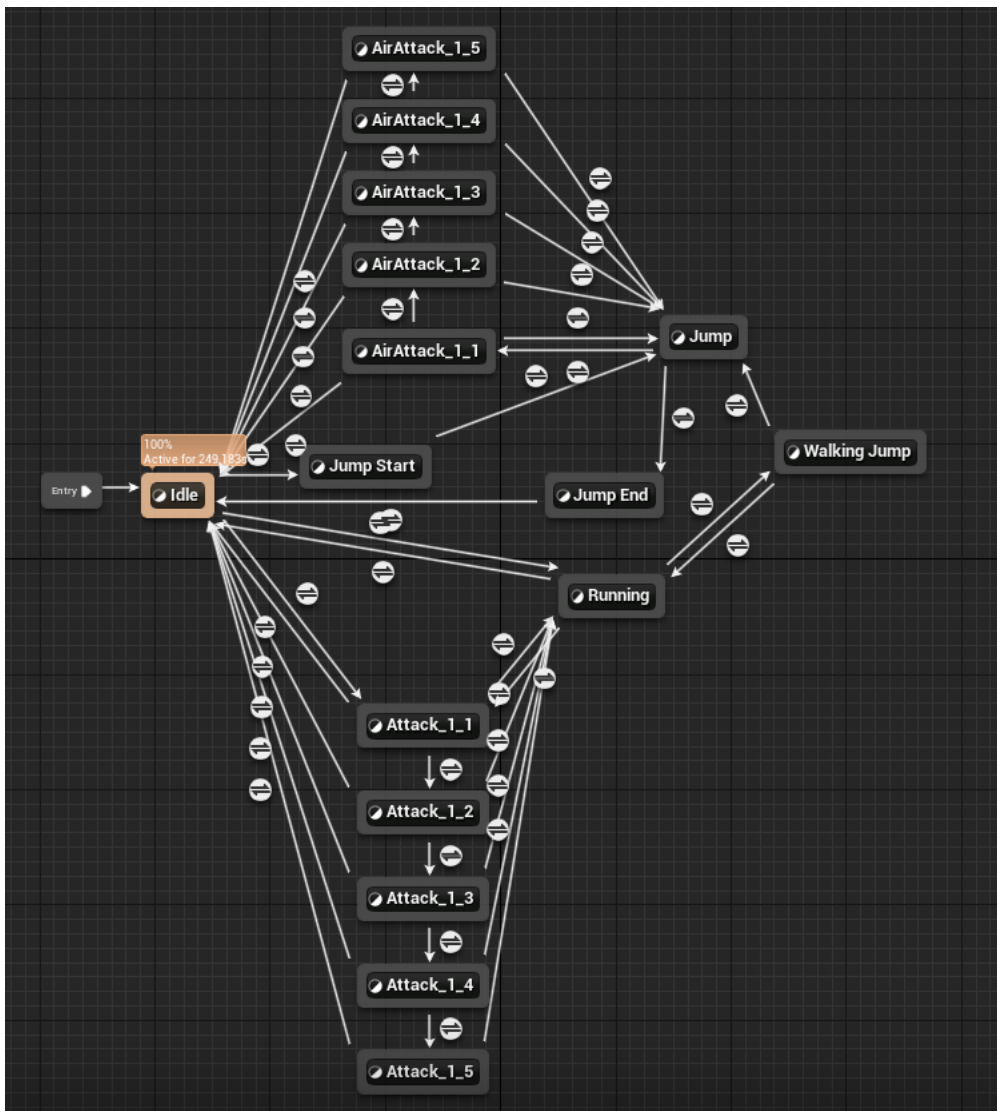
The animations have given me extra flexibility that would've been difficult to implement with the character blueprint otherwise. Animation notifies are the backbone for the input lock system, which keeps the player from activating the next attack animation in a sequence until the current animation has reached past the unlock point or ended.

Animation Blueprint Graph

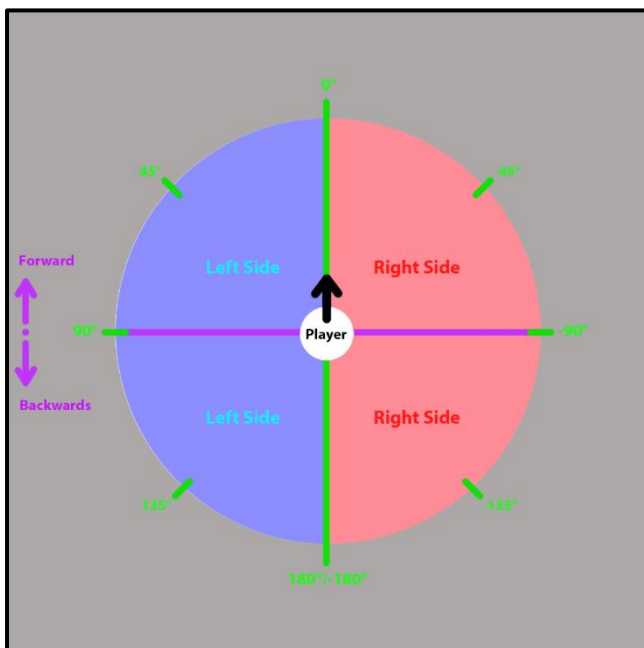
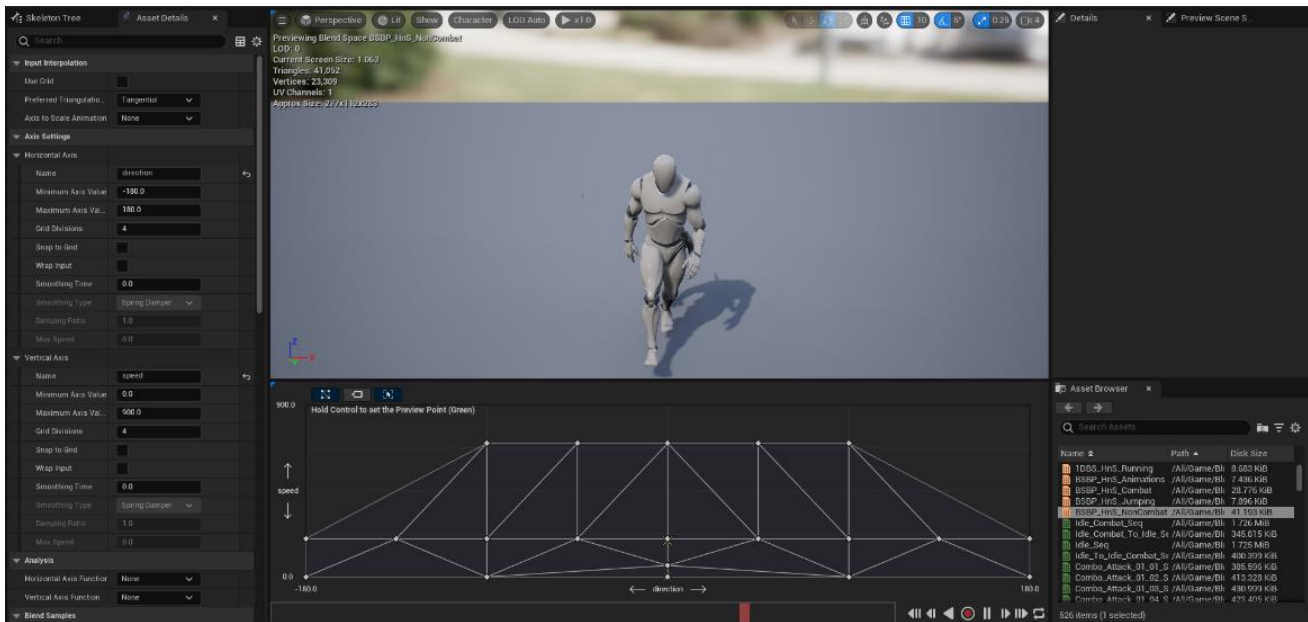


Animgraph and Locomotion Tree



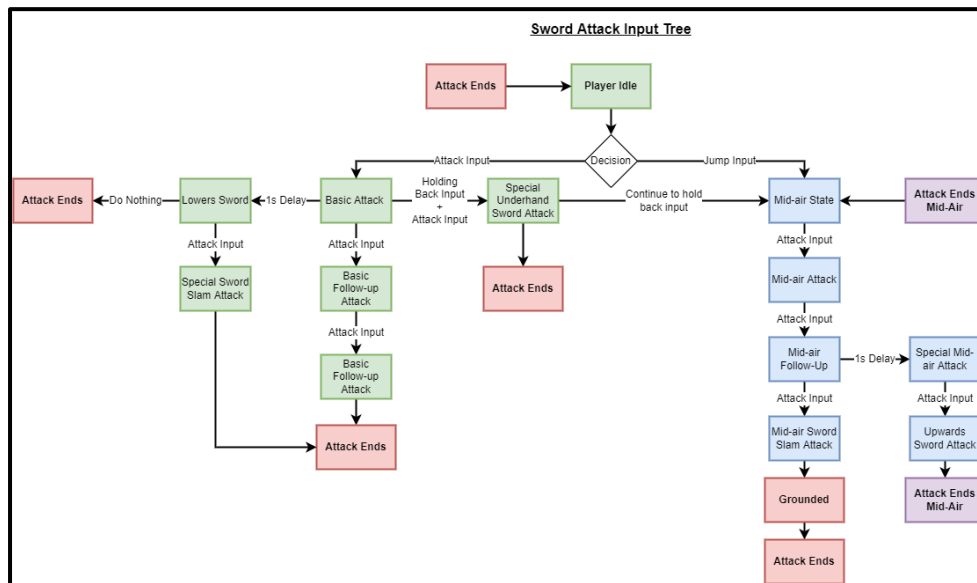


3D Blendspace and Visualisation



Combat Development End of Semester Results

Initial combat tree diagram



Combo String Graph and Technical Explanation

Critical Combatants: Combat String Breakdown Graph

Sword Combo 1	Attack -> Attack -> Attack -> Attack -> Attack	Basic sequence of sword slashes.
Air Combo 1	Jump Attack -> Attack -> Attack -> Attack -> Attack -> Attack	Same as the basic ground combo but performed in the air.

The technical breakdown is that the player has an enumeration value that is tied to an integer value in the main character blueprint. When an 'attack' input has been received, the game checks whether the player is grounded or in the air. When the state has been determined, the integer value is updated incrementally from 0 with each subsequent attack input. The enumeration and integer values increase until they reach a specified number, in this combo the max number is 5. So after 5 normal attack inputs the attack sequence ends and the values are reset back to 0.



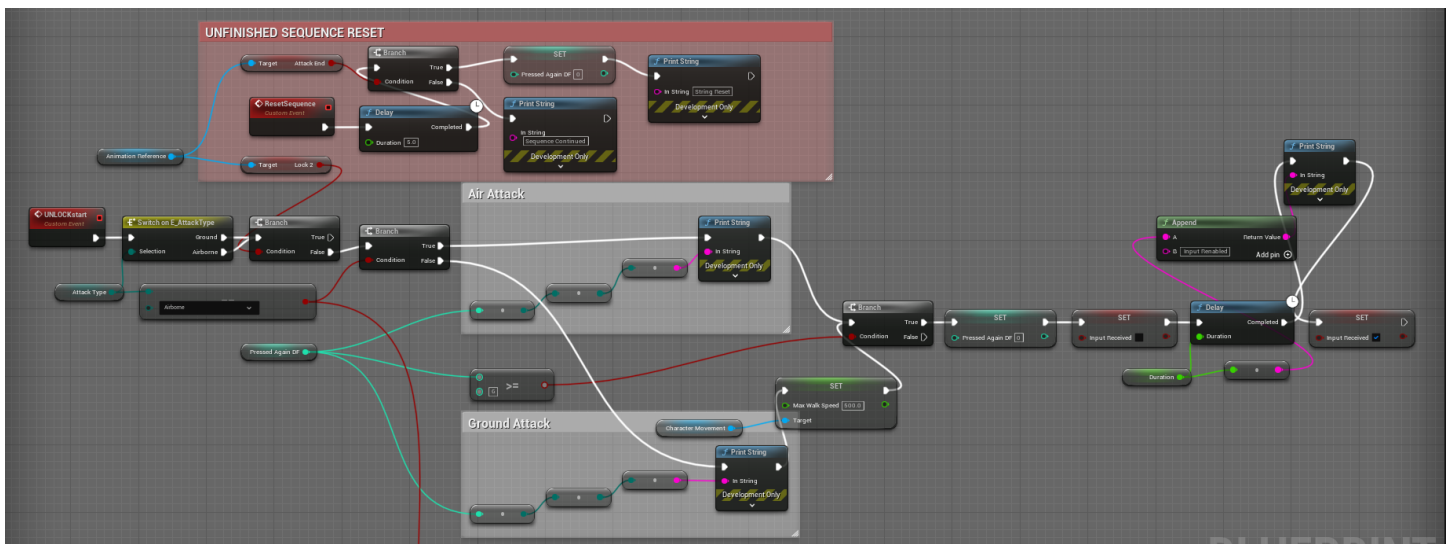
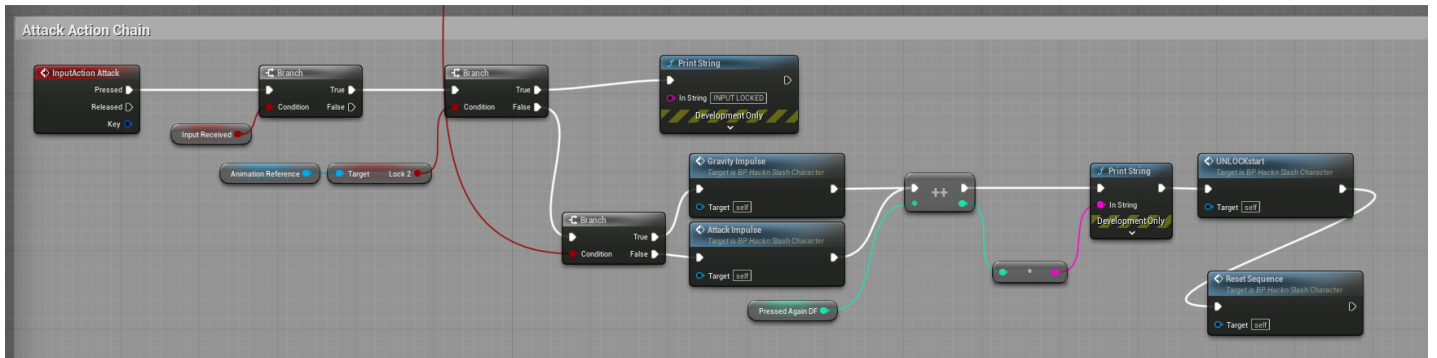
Visual Example

[CC Combat and Movement Update - YouTube](#)

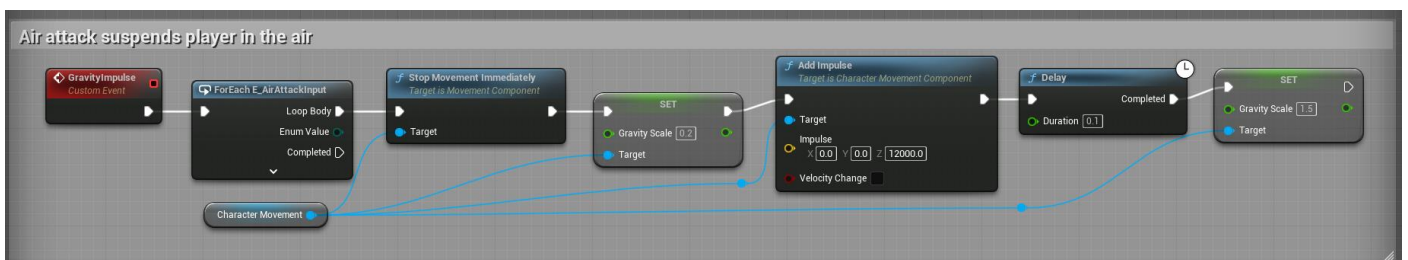
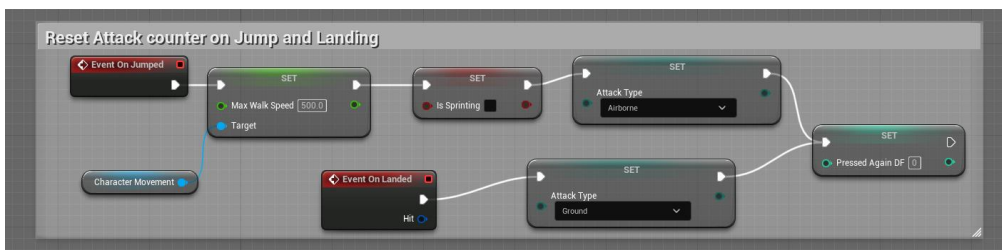
[CC Combat and Movement Update 2 - YouTube](#)

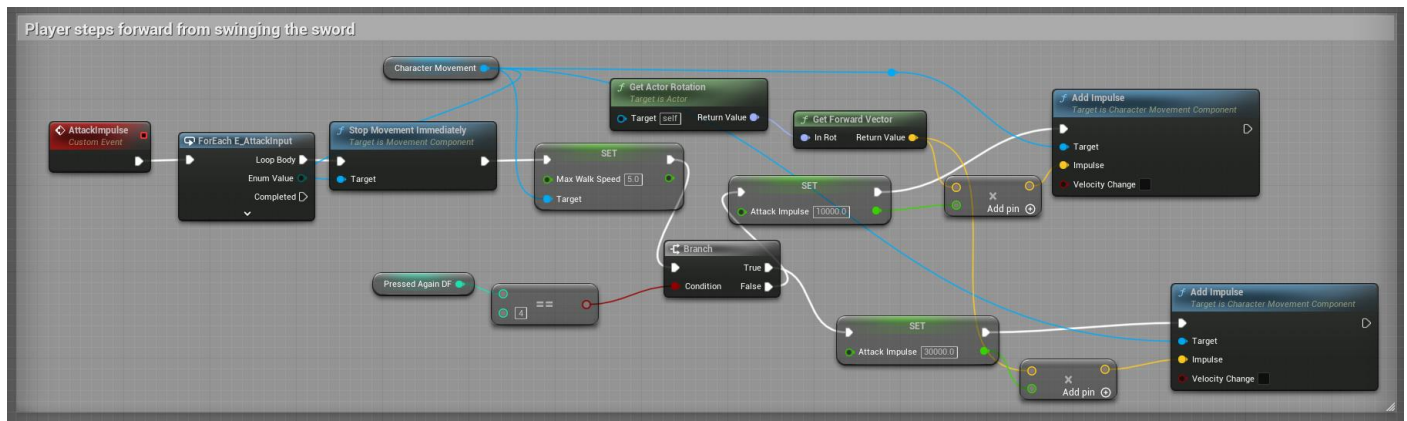
These are the results at the end of semester, the original print string blueprint was completely replaced with a new more flexible blueprint that can communicate with the character's animation graph. Animations have been successfully tied to the integer and enumeration values on the main character blueprint but lack other functionality such as hitboxes. And compared to the original combat tree, there is currently only one string of combo for the player to perform. But with this I can visualise the look of the combat, the next big tasks for the project are to implement a damage/health system and AI opponents for players to beat up.

Combat Blueprint Logic

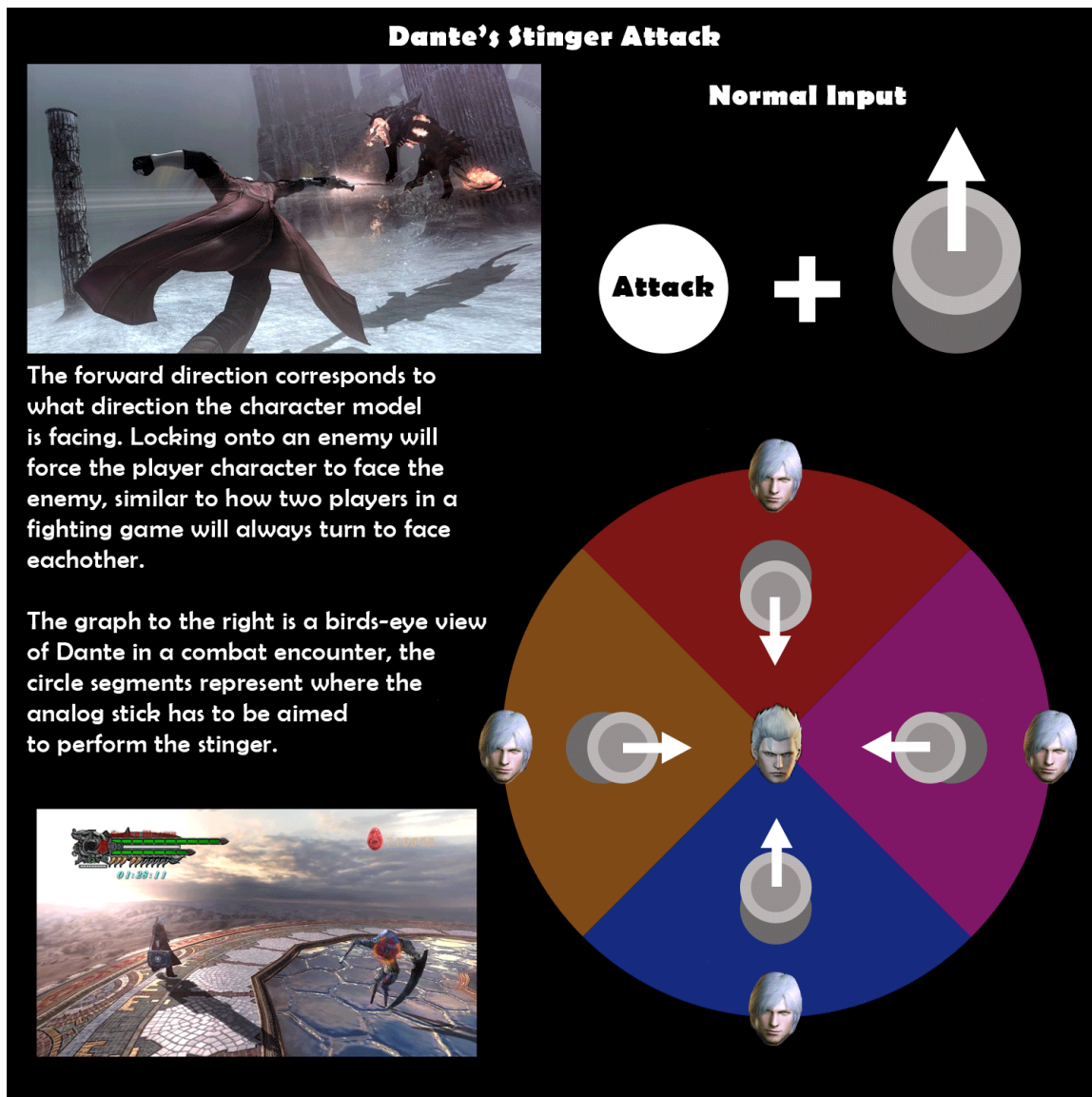


Additional Combat Blueprints





Lock-On Directional Attack Concept Mechanic

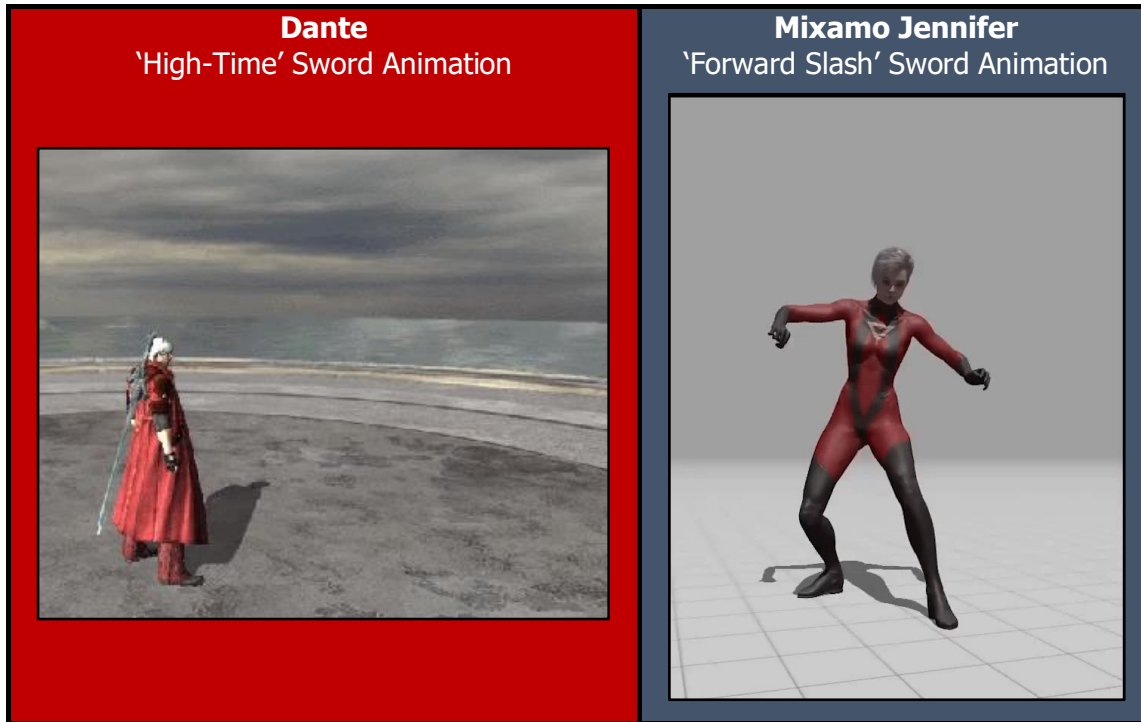


Another mechanic I want to have and consider necessary is a lock-on. There already has been some testing but the blueprints remain unfinished as I'm not at a stage of development where I can show off the usefulness of the mechanic, there's no functioning damage with attacks or enemies to battle.

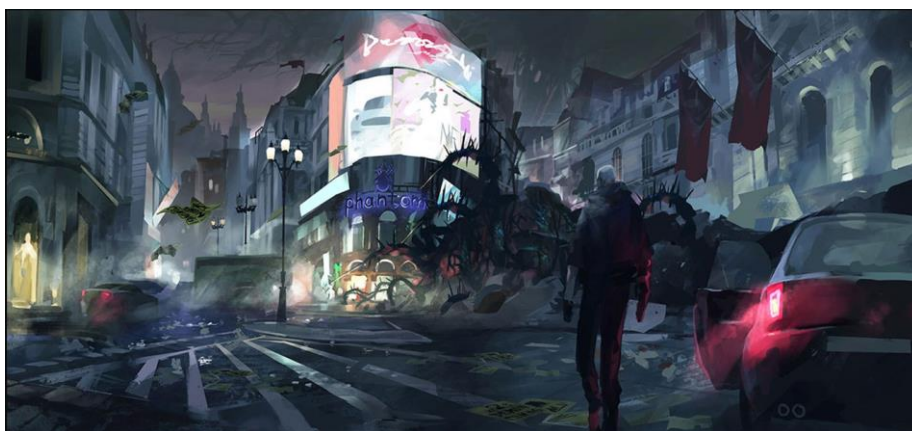
2.1 Aesthetics and Level Blockout

Asset Usage and Art Style

As a level designer, I will be pulling environment assets from the Unreal Engine marketplace to decorate my project. These packs on the Unreal Market will be linked in the reference segment of this document. Character meshes and animations will mainly be pulled from the free Mixamo resource to save costs, except for one aspect. These action games have exaggerated attack animations to facilitate the ridiculous nature of these stories and characters. All the attack animations on Mixamo are more appropriate for a grounded medieval game but would not work for a 'anime inspired' action game, see table below.



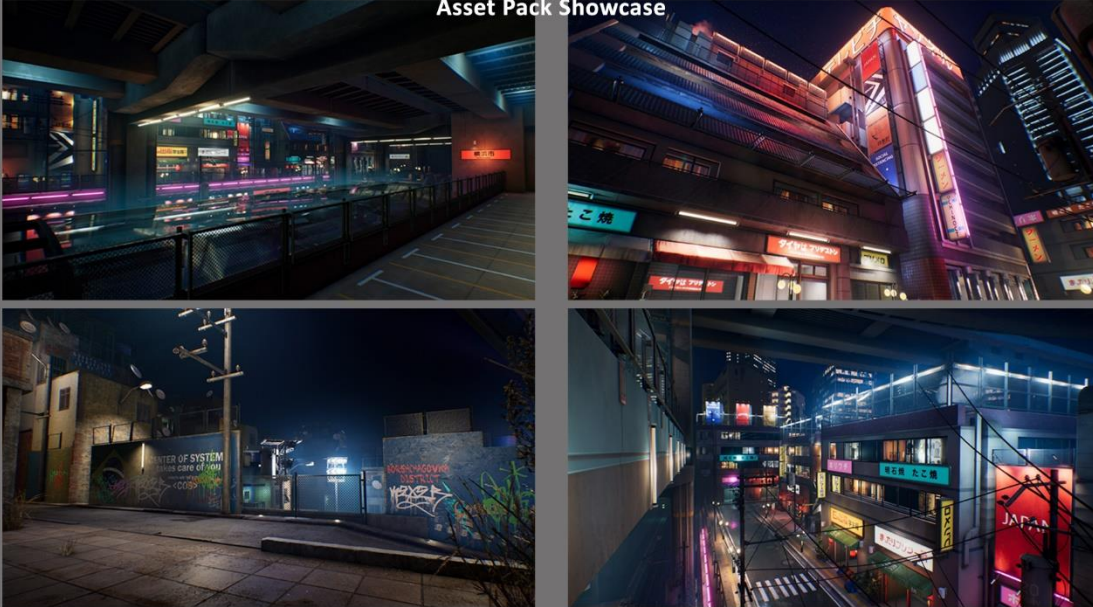
The ideal art direction of the game would be visually realistic, modern apocalyptic setting with cyberpunk elements for the technology and characters. Based off my own creative writing ideas, the main character is a 'battle cyborg', so are the enemies. So, while the characters may look realistic, they have stylised elements making them distinct from other realistically styled games.



Mesh Assets

My game's environment is based off the art style from one of the inspired games; *Devil May Cry 5*. More specifically, the levels which feature the city of Redgrave in a dilapidated state, yet the neon advertisements of the city centre still shine brightly. That's a specific style, so I reconciled I'd have to use a combination of asset packs to build a similar environment.

City Environment Megapack vol 02
Asset Pack Showcase

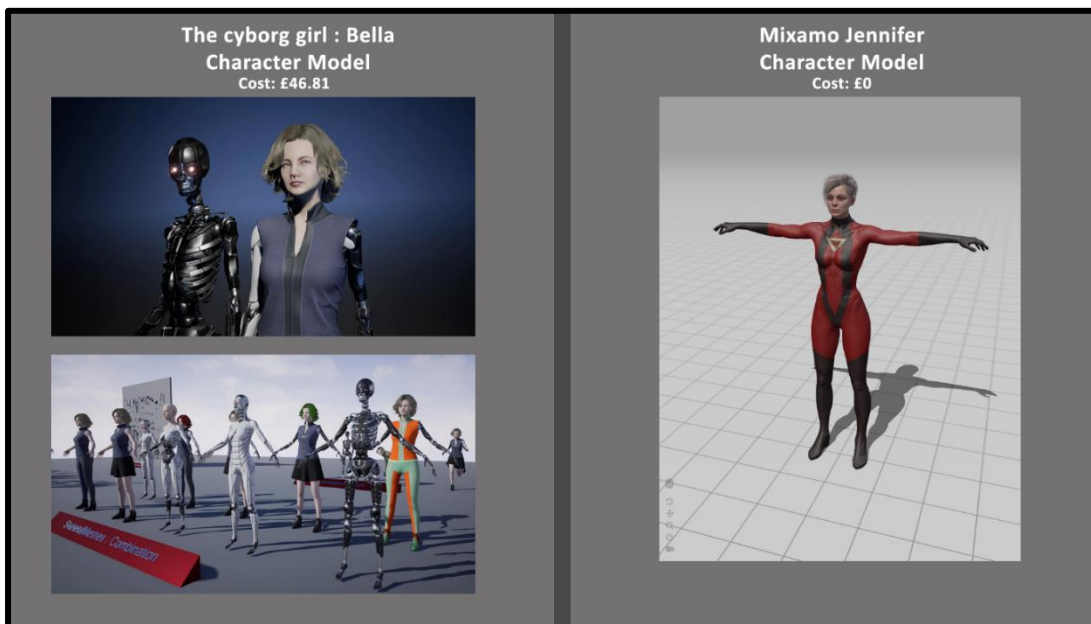


Megascans - Brick Rubble Vol. 1
Asset Pack Showcase

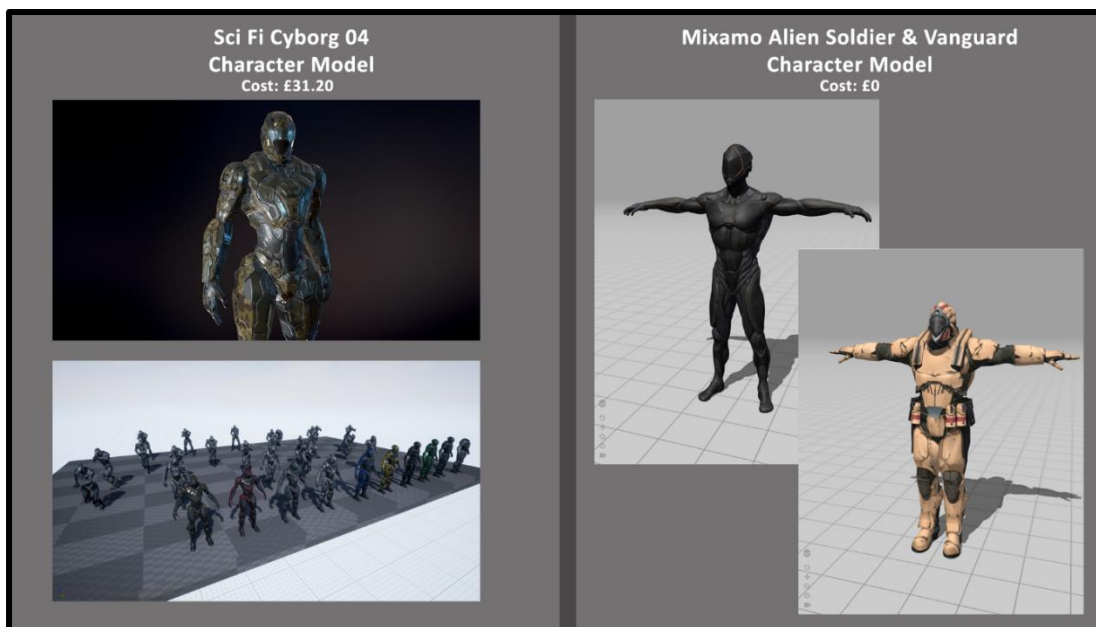


Character Assets

The player character is intended to be a cyborg, a creative decision influenced by *Devil May Cry 5* and its main character Nero. A lot of suitable options were found on the marketplace but keeping in mind the art direction for the game, I thought Cyborg Bella was the best choice. But due to costs, the game is using the free Jennifer model from Mixamo until further notice.



Enemy design is also cyborg/robot based. But there's the distinction that these enemies are less human than the main character, both for story and gameplay reasons; the story being that these individuals have sacrificed their humanity for power, and these enemies being visually distinct from the player helps with gameplay.



Animation Assets



[Sword Animation Pack for Unreal Engine - YouTube](#)

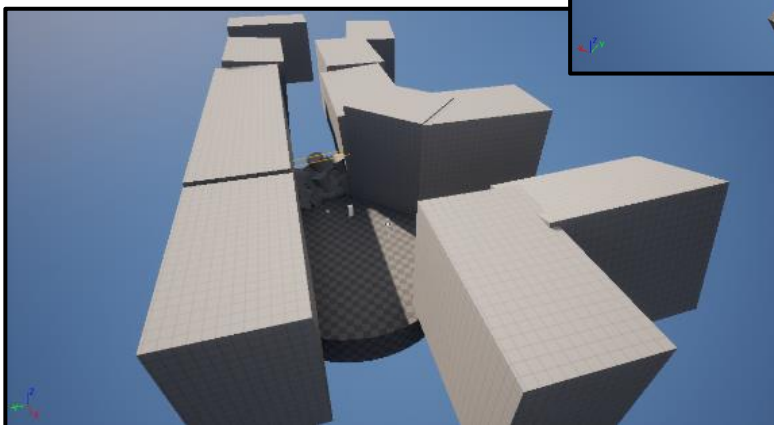
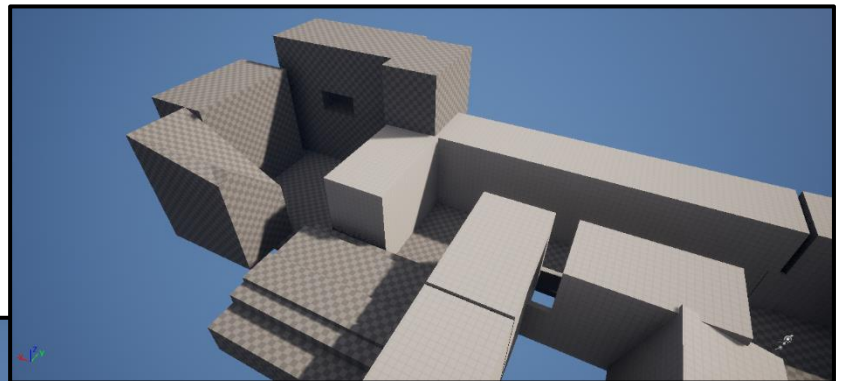
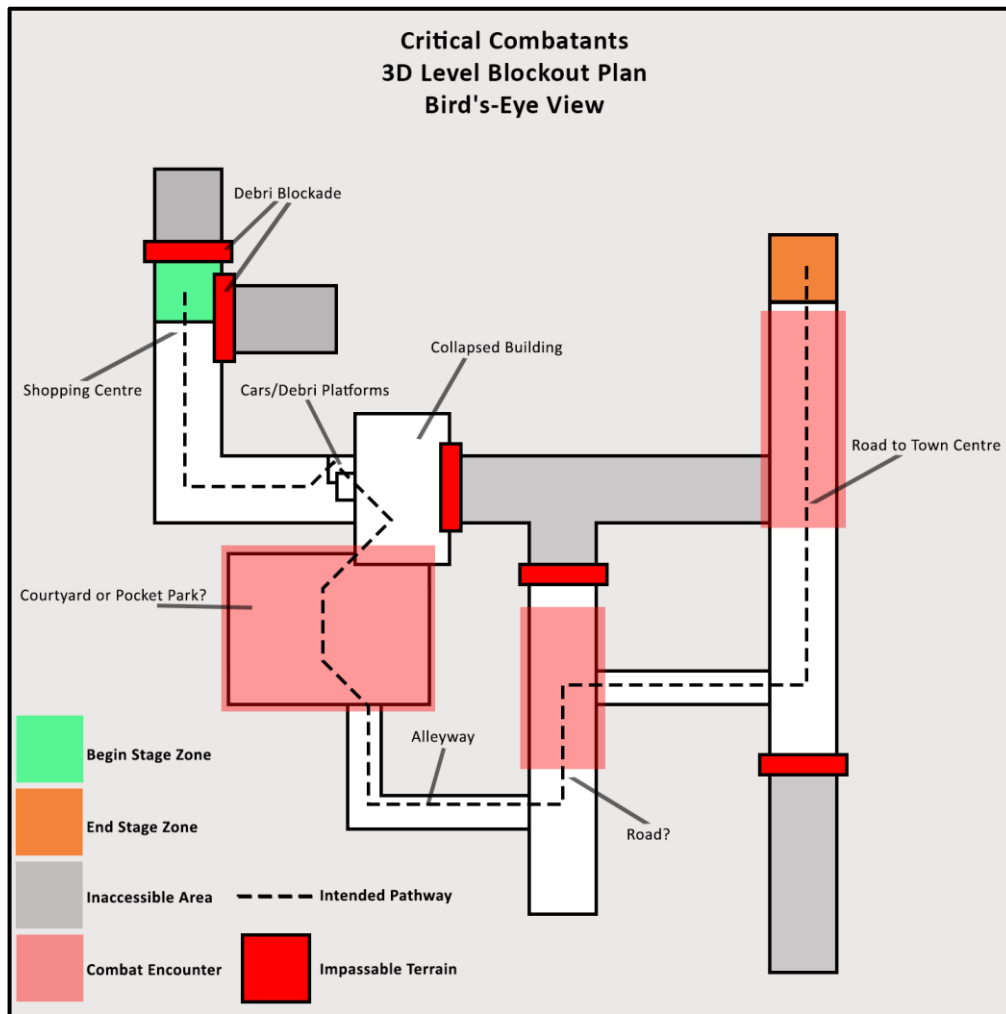
With the comparison of animations at the start, it's apparent that free alternatives for combat animations will not service the game being made. These action games need and have over the top, powerful and aggressive animations to emphasize the energy of the game. This sword animation pack is the main resource for the player character, used for idle, traversal animations that are contextual to both non-combat and combat scenarios.

VFX Assets



[Niagara Portals Vol. 1 - Unreal Engine - YouTube](#)

Level Blockout



Off my original idea for this level to be set in a ruined urban environment, I am taking many cues from the second level of *Devil May Cry 5*, which its environment was an inspiration for this project. Progression cues, mainly for combat have also been examined but condensed down to fit with smaller project. In the referenced level, combat is separated by 18-22 seconds of empty space with the enemy encounters lasting around 2 minutes. The final goal of the level would be to have 1-6 ratio of time spent traversing vs time spent fighting.

[Character Action Game Research - Semester 1 Final Year \(Devil May Cry 5\) - YouTube](#)

3. Conclusions

From the research, the early development and planning of the project. The main takeaway from the semester has been to prioritise completing the core foundation of the gameplay first. Where the current system is now has made significant progress, with mostly finished animations, but it lacks other systems like damage calculation which bars me off from developing combat encounters which also further prohibits me from working on the level blockout more. The research from studying other games has also taught me to consider other aspects that could help elevate the core gameplay, such as sound design for large impacts or how combos should naturally flow into one another.

4. Moving Forward

The Research and Development hasn't deterred me from pursuing my original goal of making a game inspired by character action games. But it has made me for cautious of the development. The concept will remain the same; a character action game set in a near-future cyberpunk. But the workflow will change, the next semester I plan to finish the combat system, while the level blockout and asset placement has been pushed to after that has been completed. As the combat system is currently, it's not enough to tell me how I should spread out or balance combat encounters in the level. Trying to force a finished blockout now I fear would waste time and cause issues for development later where I must replace chunks of levels for more appropriate geometry. Breaking it down to three main chronological goals:

- 1. Finish the combat system**
- 2. Incorporate AI and a damage system**
- 3. Finalise level blockout and asset usage**

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[I was told the appendix and reference section do not contribute to the word count, so that's why the 2000 limit has been overreached.]

5. Appendix

Image and Video References

Digital Academy Forum posts (Used to retrieve some images)

[Vanbreda Cooling, Harry - v019849k - Electronic Log Book - Digital Academy Forum \(staffs.ac.uk\)](#)

Youtube Videos

Capcom (2015) *Devil May Cry 4 Special Edition*. Capcom

[Character Action Game Research - Semester 1 Final Year \(Devil May Cry 4\) Red Queen Only - YouTube](#)

Capcom (2015) *Devil May Cry 4 Special Edition*. Capcom

[Character Action Research - Semester 1 Final Year \(Devil May Cry 4\) Full Moveset 2 - YouTube](#)

PlatinumGames (2009) *Bayonetta*. Sega

[Character Action Game Research - Semester 1 Final Year \(Bayonetta 1\) - YouTube](#)

Capcom (2019) *Devil May Cry 5*. Capcom

[Character Action Game Research - Semester 1 Final Year \(Devil May Cry 5\) - YouTube](#)

9CG (2022) *Sword Animation Pack for Unreal Engine*. Epic Games

[Sword Animation Pack for Unreal Engine - YouTube](#)

Gabriel Aguiar Prod. (2022) *Niagara Portals Vol. 1 – Unreal Engine*. Epic Games

[Niagara Portals Vol. 1 - Unreal Engine - YouTube](#)

PlatinumGames (2009) *Bayonetta*. Sega

Video recorded and edited by *Bayonetta Stuff* (2010)

[Bayonetta Moves Combos 3 - YouTube](#)

6. References

Assets Packs

[City Environment Megapack vol 02 in Environments - UE Marketplace \(unrealengine.com\)](#)

[Megascans - Brick Rubble Vol. 1 in Props - UE Marketplace \(unrealengine.com\)](#)

[City Park Environment Collection in Environments - UE Marketplace \(unrealengine.com\)](#)

[City Park Environment Collection LITE in Environments - UE Marketplace \(unrealengine.com\)](#)

[Soul: City in Epic Content - UE Marketplace \(unrealengine.com\)](#)