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COMMUNICATION OF VISUAL EFFECTS

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Communicating Through Visual Effects

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Preface

Due to the widespread use of personal computers, CGI (Computer-generated imagery) technology has become significantly mature. Its demand is increasing and it is now applicable to many fields, making it an important part of university courses. During my virtual design course at the Polytechnic University of Turin, I became very interested in CGI and began studying software such as Houdini Engine, Unreal Engine 5, and EmberGen. Furthermore, I decided to create an animated short film as my graduation design using the Unreal Engine 5 to study visual effects and system communication.

It is estimated that in any social situation, over 60% of meaning is communicated non-verbally (Judee & Aaron, 2003). From this perspective, visual language plays an important role in communication systems. My thesis focuses on exploring system communication through real-time visual effects using the Unreal Engine, presented as a two-minute animated short film and a ten-second video.

Creating an animated short film is a test of the possibilities of visual effects that can be quickly and clearly understood by the audience. The audience can understand the information conveyed by the images, and I used digital technology to create the environment, character models, and character animations. The continuity of visual effects is aimed at better communication with the audience. The ten-second video showcases a small amount of visual effects and goes into depth on the details, such as when the ball releases energy, the ground contains over eight different visual reaction effects.

Regarding the theoretical part of the thesis, it mainly includes research on semiotics and point-line-plane for visual effects, and involves the history of special effects applications. In the second chapter of the thesis, I explore the technical possibilities for achieving visual effects, including an introduction to the Unreal Engine. The third part of the thesis is about how I came up with a story that I worked on for my animated short film. The final chapter is about my specific production process, mainly for the two-minute animated short film, and secondarily for the ten-second special effects design.

Thanks to the development of new technology, independent producers can now complete their own animations through mature animation production platforms, increasing the possibilities for their works. This is accomplished by using Unreal Engine 5 as a foundation and other software for creating 3D animations.

Keywords: visual effects, digital effects, Unreal Engine 5, visual communication, animated short film, digital technology, semiotics, logic, independent producers, application of new digital technology, game visual effects.

Two-minute animated short film

https://www.youtube.com/watch?v=YIcCkcOud2s

Ten-second video

https://www.youtube.com/watch?v=nuhRzKjPIgA

01 Definition of Visual Effect

Overall, visual effects are an incredibly powerful tool for filmmakers and game developers, allowing them to create stunning visuals and bring their imaginations to life on the screen. With the rapid development of new technologies, the possibilities for VFX are expanding rapidly, making it an exciting time to be involved in the world of visual effects.

1.1 Semiotics

Charles Sanders Peirce (01)

1.1.1 Introduction To Pierce

Semiotics was created by Swiss linguist Ferdinand de Saussure and American pragmatist philosopher and semiologist Charles Sanders Pierce (Odhiambo, 2022) "Semiotics, described by its founder Ferdinand de Saussure as 'a science that studies the life of signs within society. Semiotics looks at any system of signs whether the substance is verbal, visual or a complex mixture of both", (Dyer, 1982) "His pragmatic logic and scientific methodology largely represent the application of interactive and intercommunicative triadic processes, best viewed as strategic and dialogic conceptualizations of logical aspects of thought, reasoning and action. These viewpoints also involve pragmatic issues in communicating linguistic signs, and are unified with his diagrammatic logic of existential graphs." (Pietarinen, 2006)

1.1.2 Three Trichotomies of Signs

Peirce's Three Trichotomies of Signs consists by the sign, object, interpretant.   And Peirce's contribution lies in adding an interpretant. And the explanation of things will reflect the subjective factors of different people. (Youzhen Li,1993)

According to Pierce, everything in the world is a sign, such as a glass of Coke, an idea, a sound, but except for experience and habit, it does not belong to the scope of sign, because the cognition of sign comes from habits and experience. And sign is the only medium for communication and transmitting information. The information on sign is transmitted through thought.

The elements related to think are experience and cognition, and habit is an important element that causes the difference between experience and cognition. (Pietarinen, 2006)

To interpret it simply, it can be said that symbols are objects, and objects have the properties of symbols. In addition, the relationship between symbols and interpretation can be vividly compared to the process of blurring dreams to vivid hallucinations. (Pietarinen, 2006)

To do a good job of the explanation, it is necessary to design this vivid illusion into a real dream, so how to construct a real dream?

For the project, creator builds the interpretant item so that the public can understand it. First, it is necessary to determine the purpose that needs to be conveyed, and then find the visual sings related to this purpose. Then the visual signs are integrated, reconstructed, After the input symbols are processed and integrated, the output interpretation items need to be understood by the audience for the purpose of spreading the concept.

It also involves, "reality", this keyword is also a word of concern. In Chapter 2 it will be explained how to construct a real dream.
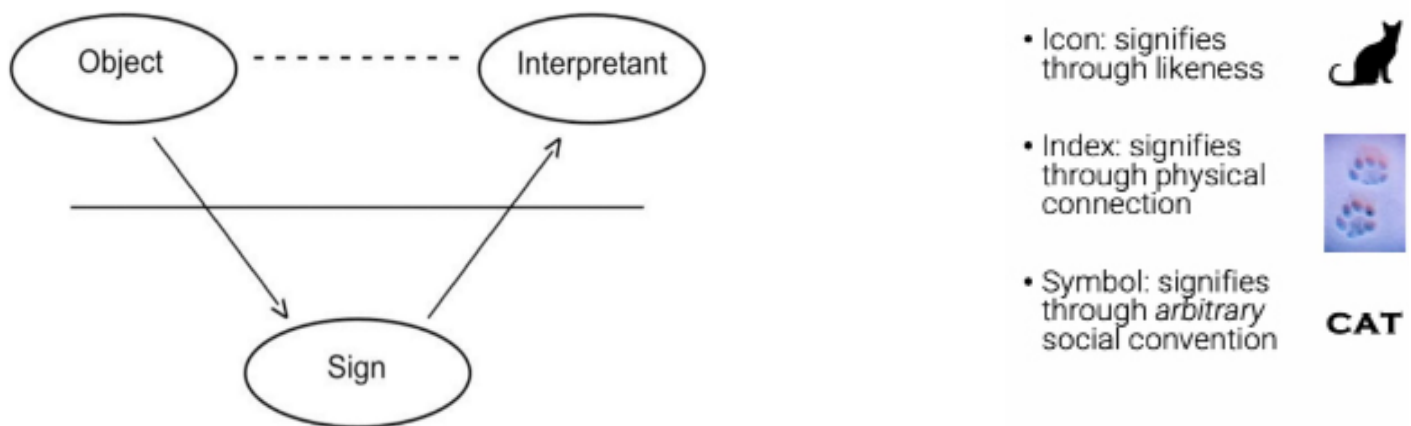

Figure1: The Peirce's model of the sign by Jappy (2003) [03]

[02]

1.1.3 Summary

Creators needs sign to construct their own world of meaning and to be able to disseminate information to audiences. In essence, the film and game industry belongs to a symbol industry, and it is an one-way communication. As Peirce said, sign is the medium of all communication (Pietarinen, 2006)

Sign is used as a medium to communicate with users. These fields are creating huge amounts of economic value every day. How to provide users with better sign communication is a topic of great significance.

01.   From Wikipedia, the free encyclopedia.
02.   Origin: information below the picture.
03.   The Peirce's model of the sign by Jappy (2003)

1.2 Point And Line To Plane of Visual Effect

Kandinsky is the representative figure of abstract in the last century. His book - The Abstract Theory of Points, Lines and Surfaces has a profound impact on visual research. At the beginning of the last century, the development of semiotics also included abstract art. The process of its evolution was that natural objects were highly symbolized and ordered into compositions of internal relationships. he analyzes each element of painting, both external and internal. In the case of the outer concept, each individual thread is an element, and in the case of the inner concept, the inner tension active in it. (Kandinsky, 1926)

The concept of tension, each shape has its tension, just like each person's action has its corresponding meaning and expressive meaning. Tension refers to the inner strength of an element or visual image.

The relationship between point, line and surface and special effects, the relationship between point, line and surface in the special effect design system, or how to analyze how the special effect system composed of the three elements of point, line and surface can help people communicate.

> ❝ *In the final analysis,every serious work is tranquil... Every serious work resembles in poise the quiet phrase, "I am here. " Like or dislike for the work evaporates; but the sound of that phrase is eternal"*
>
> — **Wassily Kandinsky**

(01)

1.2.1 Point

Points are the simplest existence of geometric relations, and although they are concise, they also have powerful expressive power. It's introverted and doesn't lean either side like a scale, while its shape of a steady arc has a certain softness in contrast to the triangular lines. In written text, a dot marks the end and the beginning of a sentence. It can also be regarded as a bridge from one entity to another entity, and further, in the relationship between point, line and surface, it is not only the foundation but also the bridge. (Kandinsky,1928)

In addition, in the field of games, for example, after a skill ends, some small particles will float in the air and then disappear. This is also a common communication between the creator and the user, implying that the user of this magical skill has ended.

The size and shape of the dots can be changed, how can we get a harmonious picture effect? 1. The relationship between the point and the screen, that is, the size ratio of the point. 2. The size ratio between a point and other shapes on the same screen.

For example, I'm thinking about how to polish my robot model to look more uniform and detailed. Its point elements are not well represented in the model. For beginners like me, the problem often encountered is that the special effects produced are not rich enough and the connection is not smooth enough, so my point use must be unreasonable of.

In addition, the repetition of points mentioned in the text is a powerful means to strengthen inner emotions. For example, the repetition of sand forms a powerful desert, and the repetition of water droplets forms a vast ocean. The simpler the repetition, the more powerful! When I'm about to build a powerful or visually striking images, the power of repetition of dots can be applied (Kandinsky,1928)

And the special effects technology in Unreal Engine and Unity are all based on points, to achieve special effects

(01)

(02)

(03)

1.2.2 Line

Line has tension and direction

When a point is given a direction to move, the point is given a new meaning-the line. By the other perspective of thinking, A force is applied to the point as it moves and also that force is destructive, so the line can be definite that is more dangerous than point. (Kandinsky,1928)

And the line has the property of moving. In my animation, there are pictures of characters appearing from bottom to top. In the composition of this visual effect, the meaning of the line can be visualized, such as the line moving vertically upward from the ground, so that the visual effect can better reflect the role of forcing

A line is an infinite series of points. Geometrically understood, a line has a length but no width. A line is a connection between two points, or it is a path that moves points. A line can be a positive mark or a negative gap.

Lines appear at the edges of objects and where two planes meet. Graphically, a line has many weights; the thickness and texture of the mark and the path determine its visual presence. Lines are drawn with pen, pencil, paintbrush, mouse or digital code.

They can be straight or curved, continuous or broken. When a line reaches a certain thickness, it becomes a plane (Lupton&Phillips,2015)
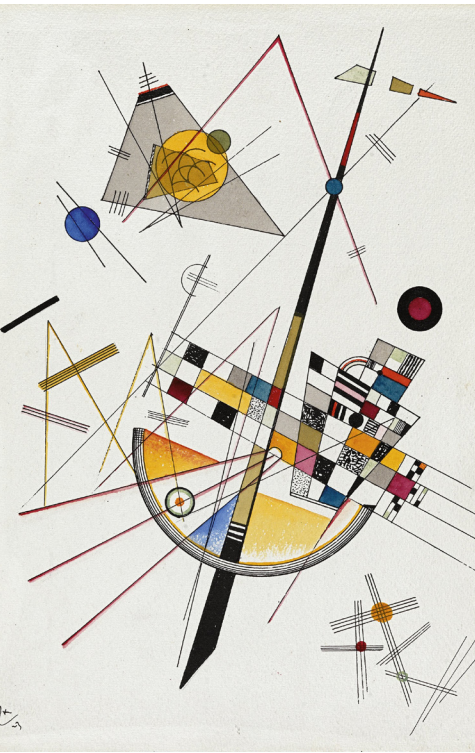
1.2.3 Plane

A plane is a flat surface extending by height and width. A plane is the path of a moving line; it is a line of breadth. A line closes to become a shape, a bounded plane. Shapes are planes with edges. In vector- based software, every shape consists of line and fill.

Kandinsky believes that the surface is the material plane that accommodates the content of the work, which is defined by two horizontal lines and two vertical lines, making the surface independent of the surrounding space, pointing out that the nature of the line determines the nature of the surface's calm sound. In Kandinsky's theory, the surface is a material with a relationship between up and down and left and right. "Up" is a feeling of sparseness, ease, liberation and freedom in the plane; the role of "down" is a completely opposite concept compared to "up", which is dense, heavy and restrained: "left" is the same as "up" They have the same concept, but there are still some differences between them. For example, the thinness of "up" is a higher degree, and the "left" contains more denser elements; the degree of "serving right" is the continuation of "lower" (Kandinsky,1928)

01. Color Study. Squares with Concentric Circles
02. Wassily Kandinsky,Delicate Tension. No. 85,1923, Watercolor and ink on paper. 35.5 × 25.2 cm, Museo Nacional Thyssen-Bornemisza, Madrid, Inv. no. 610 (1977.77)
03. Wassily Kandinsky. Grey Circle, 1923. watercolour and ink on paper, Sheet: 46.8 × 42 cm. Gift of Anne Callahan, 2007. © Art Gallery of Ontario 2007/61

1.3 Main Application History of Visual Effect

1.3.1 Introduction

Visual effects (sometimes abbreviated VFX), were prominent only in so called effects-driven live action features movies. But Visual effects, also known as VFX, were previously mainly used in movies that relied heavily on special effects. However, in recent years, their use has expanded to include supporting shots in movies with fewer effects, as well as in other areas such as TV shows, commercials, music videos, and video games. VFX are increasingly important in the video gaming industry, as they can give games a more polished and professional look, create a more engaging experience for players, and enhance the overall immersion of the user in the game's world. The main goal of using visual effects in games is to keep players interested and engaged by providing an attractive and enjoyable gaming experience.

1.3.2 Perspective of Video Game

Visual effects (VFX) are widely used in the video game industry to enhance the player's experience and keep them engaged. Researching VFX is important for improving communication between the VFX and the players, and using VFX as a bridge to convey information. VFX are crucial for giving video games a professional look, creating an engaging experience for players, and immersing the user in the game world. The ultimate goal of VFX in video games is to keep players interested, engaged, and immersed in the game.

1. Game special effects are visual effects that create a physical sensation similar to reality.

2. Visual effects are effects that appear when game or movie characters use techniques or objects to deform, enhancing player engagement and immersion.

3. Visual effects in movies and games can create unique effects that stimulate imagination and create a more realistic experience.

Visual elements are crucial in creating game effects. Through a cognitive process, players can see, hear, and touch objects in the game. Visual and auditory aspects are the most significant factors in player experience. To achieve realism, players need to use their imagination to "cognize" the game's content. Video game visual effects convey information to players faster and more easily, helping them understand and recognize the game's content.
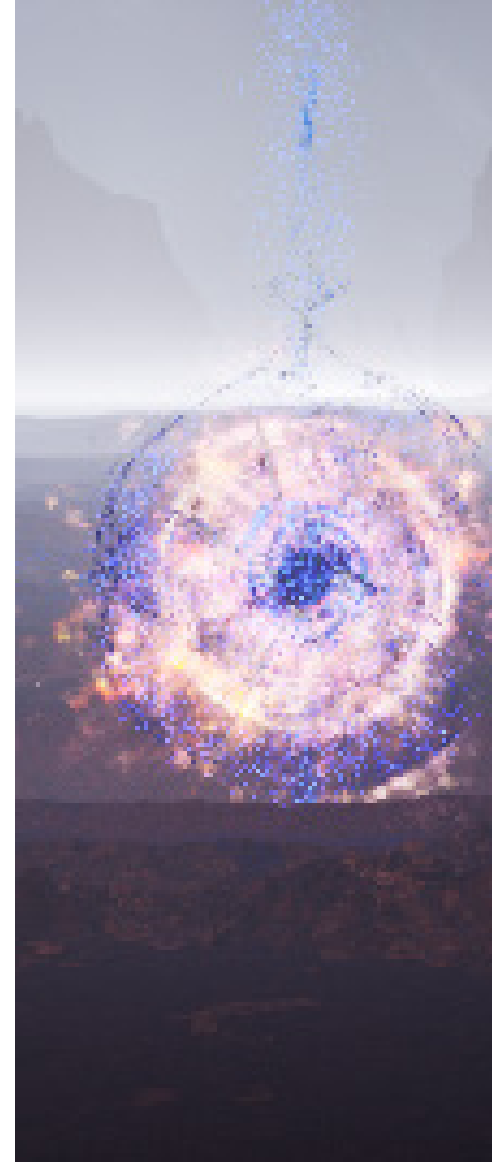
(01)

1.3.3. The film application of VFX

The application of visual effects of movies, analyzes the application of visual effects on movies
from the beginning of the last century to this century, The application of large-scale visual effects began in the field of film, initially in film props, stop-frame animation, magic tricks, and then the application of camera technology, green screen, matte painting, etc.,
Later, with the development of computer technology, digital visual effects also shine in the film field. The crude reality effect of the primitive films—in terms of the low level of naturalism that is explicitly different from live-action—was increased by the early Hollywood filmmakers in the 1920s. They constructed large scale sets, used numerous props and extras, and produced and invented physical and visual effects, including wire-action and traveling matte, in order to produce a more sophisticated, fashionable, and complicated reality effect. (Jae Hyung Ryu,2007)

(A trip to the moon) 1902
Stop-motion is the visual effect with the purpose of invisibility, after the era of the early
Films. (Jae Hyung Ryu,2007)
For example, the aliens turned into smoke after being killed, and this stop-motion is an effective tool to help the plot advance, so that the phenomenon that is impossible in reality appears in the movie with an effective visual expression ,
From the current point of view, there are relatively obvious film frame delays, but it does not affect the overall viewing experience of the audience, and the special effects of smoke are still widely used in film and television animation, game industry, TV show, and advertising.

(02)

Georges Méliès is an outstanding representative of genius in special effects production in the last century
In the movie *The Merry Frolics of Satan* made by George in 1906, the production of the volcano's erupting magma VFX, first used a flat volcano painting as the background, then orange-yellow real smoke erupted in the crater, and real sparks from the crater from the crater. The effect of down to up and then down again

The Thief of Bagdad employs six kinds of visual effects: stop-motion, dissolve
(With double exposure), iris, matte painting, glass shot, and double/triple exposure
(superimposition). These visual effects are very early models, and their techniques are basic in comparison to those of the present. (Jae Hyung Ryu,2007)
These special effects technologies are almost all related to the camera, because the limitations of the technology of the times can make the effects at that time enough to win the Oscar for best special effects that year.
Under the application of the early blue screen special effects, the flying carpet, the flying horse, the giant emerging from the magic lamp, and the flying of the giant are very shocking.


(03)

Legendary director Stanley Kubrick's 1968 film *"2001: A Space Odyssey"* is undoubtedly a film history classic. In the 1960s, when special effects were still in their infancy, Kubrick used a plethora of realistically detailed models and experimental, forward-looking cinematography to create this sci-fi textbook film.
This scene, which was mistaken by many audiences for computer special effects, was actually a large rotating ring-built brick by brick by Stanley Kubrick's team. Although the amount of engineering is large, it does not affect the presentation of details at all, and the lens can withstand scrutiny when it is scanned anywhere.

Especially in the second half of the film, which lasted for several minutes, the time-travelling through montage special effects, in that era when there was no computer special effect software, or even drawing software was born, Kubrick presented us with such a gorgeous and psychedelic effect. space
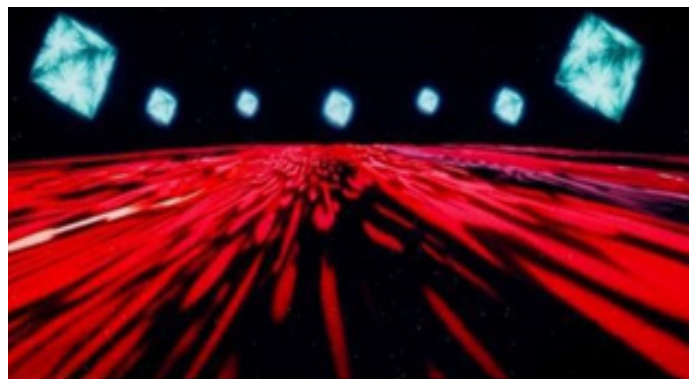
(04)

01. A Trip to the Moon (1902) - Turner Classic Movies
02. One of my very favorite Georges Méliès films is Les Quat'Cents Farces du diable, literally translated as The 400 Tricks of the Devil. The Merry Frolics of Satan (1906)
03. The Caliph enjoys an airborne horse ride over his city in one of the first-ever Technicolor blue-screen travelling mattes for The Thief of Bagdad.
04. Arthur C. Clarke and Stanley Kubrick's 2001: A Space Odyssey

Beginning of the early 1980s, began to take over visual effects area, by using computer software to make more traditional visual effects
The special effects of *The Matrix* were groundbreaking and landmark in that era. The Matrix has 412 special effects shots, of which bullet time is the most famous special effect shot, and it has also been imitated by many companies later, but if there are many subjects, and it is only suitable for a small number of object actions!
The Matrix developed the unique visual effect of bullet-time
shot creating slow-motion moving image by means of continuous taking 124 still images.
Likewise, the principle of composition of the new visual effects with the support of digital technology represents postmodernity of the age of digital. The advance of digital effects reflects the transition of not only the social formation from Ford-ist production system to the
worldwide network system embodied by the development of transportation and digital technology, but also visual effects themselves from the studio-oriented an-alog visual effects to the computer-networking digital visual effects. (Jae Hyung Ryu,2007)

In the 1990s, the application of digital special effects on the film and television production industry became popular, almost 20 years later the movie *"Avatar"* was a pinnacle work based on digital special effects technology. This technology mainly uses computer two-dimensional animation and three-dimensional animation software, starting from the construction of the digital model to the generation of dynamic pictures required for film and television works. Although the whole process doesn't require the participation in photography, it can produce a good visual effect. Real objects, so as to achieve the effect of "creating something out of nothing" in film and television creation. This technology is widely used in science fiction film and television works. The film "Avatar" uses computer-generated image technology to create an alien psychedelic realm for the audience - Pandora. It has a complex and unique ecosystem, in which there are towering giant trees up to 900 feet high, lush rainforests full of colorful and exotic plants, scattered mountains floating in the air, jellyfish-like tree spirits, glowing at night forest plants and ferocious monsters, etc.

01. The Matrix (1999) - Movie Review : Alternate Ending
02. Avatar (2009 film), directed, written, co-produced, and co-edited by James Cameron

(02)

02

How Visual Effect Can be Helpful for Systemic Design Communication

visual effects can be an incredibly powerful tool for communication, helping to convey complex concepts, enhance emotional impact,
create immersive environments, add emphasis, and create memorable moments. By leveraging the power of VFX, filmmakers, marketers, educators, and others can create more engaging and effective communication materials that resonate with their audiences.

2.1 The Basic Technology of Digital Visual Effect
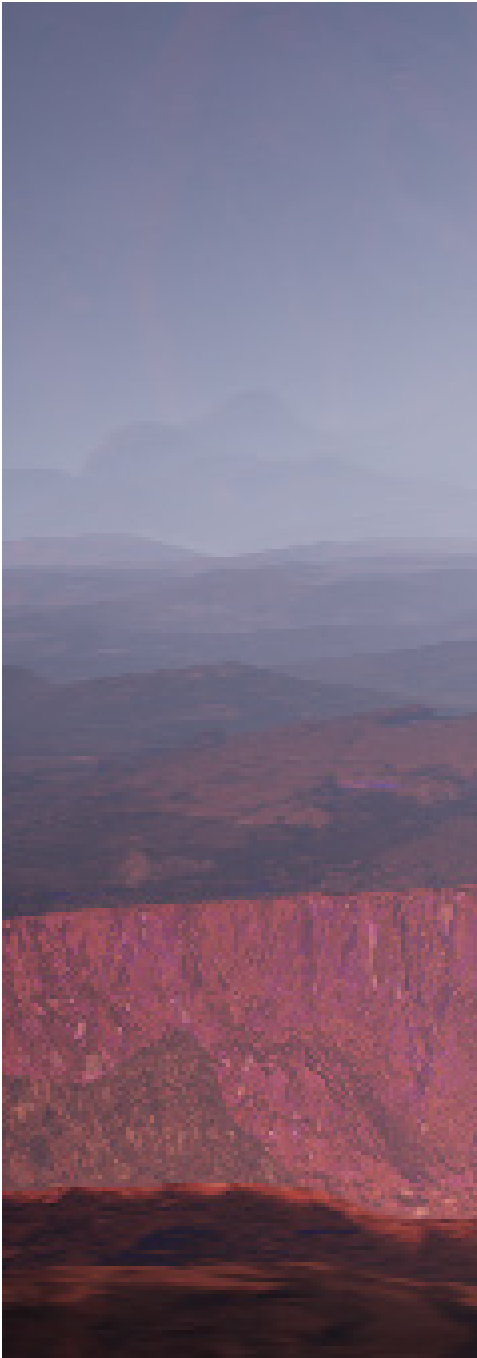
Computer-generated particle is a common technique that is a staple visual effects production, this technique essentially simulates the motion of particles that are subject to a variety of forces, By rendering thousands or millions of these particles in a variety of ways it is possible to simulate different materials such as fire, smoke, liquids, soil, and even hair.

Dynamics simulation, also known as motion dynamics, creates realistic movement of rigid objects or fluids by simulating their physical properties and natural motion laws. This technique considers the characteristics of solids, liquids, and gases, and also takes into account external forces such as temperature, pressure, friction, gravity, and collisions. Dynamics simulation can be combined with other animation techniques such as inverse kinematics and keyframe animation.

A fluid dynamics simulation can simulate the motion of non-solid materials such as liquids and gases through time and space, using different pressures and temperatures to visualize changes in density, mass, and viscosity. Ideally the dynamic simulations should be sampled at a minimum of 24-30 frames per second, which is the rate at which film and video are recorded and platform games played at. (Kerlow, 2009)

For example, Maya, Houdini software can be used to create effects that cannot be achieved with actual shooting or props, such as wind, rain, thunder and lightning, landslides and fissures, ghosts, aliens, house collapses, volcanic eruptions, tsunamis, etc. You can also use Maya software to create simulated characters, such as sprites The mouse in Little Mouse, the squirrel in Ice Age, Master Yoda in Star Wars, and more.

For example, it is used to express the water splash generated by the ship sailing on the sea and the sea surface. People stand on the deck and see the fish school in the sea. Those fish schools can be completed by particles. Particles are used to replace different types of fish models, so that a fish can be placed in the position of each particle to get the effect of cluster animation.

The rigid body can make the object model in the 3D software participate in the dynamic calculation (understood as computer calculation), such as the process of an object in my hand falling to the ground and bouncing on the ground. Manually define the animation process
But if there are countless fragments falling and colliding with each other, for example, there is a wall, a cannonball hits the past and the droplets are scattered. This series of complex motion processes are completed by the animator one by one, and the workload is very large, which requires Convert the fragment model of the object into a rigid body, and then convert it of a rigid body to participate in a series of dynamic solutions, and obtain the simulated motion through the solution.

Soft body is a soft object. In Houdini, the dynamic solution will be used to make the object get soft motion, such as: clothes, national flags, elastic skin, curtains, or hair that flutters in the wind, etc.

2.2 Unreal Engine 5

2.2.1 Introduction of UE

Unreal Engine (UE) is a 3D game engine developed by Epic Games that was first showcased in the 1998 game Unreal. Originally designed for PC first-person shooters, it has since been used in various genres of games and adopted by other industries, notably film and television. I am using UE for animated short film production, which involves creating visual effects, environments, character and special effect materials, importing character models and animations, importing Houdini special effects, setting camera paths, using the animation sequencer, and rendering videos.

2.2.2 Introduction of Niagara

This part of the information comes from the Unreal Engine5.0 Documentation
Niagara System is the main job for making visual effects in Unreal Engine
With Niagara VFX system, technical artists can create visual effects without pro-grammer support. thanks to the adaptability and flexibility of th e system

In the Niagara system, there are four core components: system, emitter, module, parameter

1. System: The Niagara system is a container that contains everything needed to create an effect. Inside this system, technical artists can create desired effects

2. Emitter: The function of the emitter is to generate particles in the Niagara sys-tem, it controls how particles spawn, disappear, and look and move etc.

3. Module: "Modules are the basic building blocks of effects in Niagara. You add modules to groups to make a stack. Modules are processed sequentially from top to bottom." (From Unreal Engine5.0 Documentation)

4. Parameter:"Parameters are an abstraction of data in a Niagara simulation. Parameter types are assigned to a parameter to define the data that parameter represents. There are four types of parameters:

• **Primitive**: This type of parameter defines numeric data of varying precision and channel widths

• **Enum**: This type of parameter defines a fixed set of named values, and as-sumes one of the named values.

• **Struct**: This type of parameter defines a combined set of Primitive and Enum types.

• **Data Interfaces**: This type of parameter defines functions that provide data from external data sources. This can be data from other parts of UE4, or data from an outside application." (From Unreal Engine5.0 Documentation)
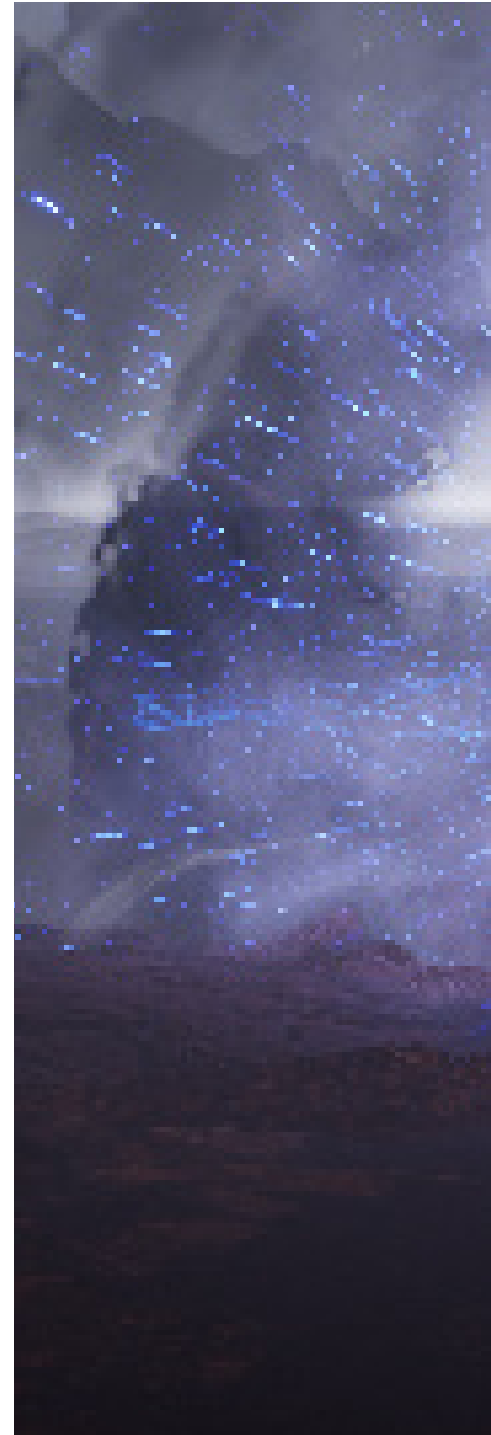
2.3 How to build "real dream"

2.3.1Observed

For explosions in real life, the movement of smoke, dust and liquid is complex, so we need a good observation ability to analyze the effect composition.

"How many frames does it take to get to the maximum size?
Why is the smoke spiky?
Only one color of smoke?
How much shadow do you cast?
Is the wind affected?
Can you see the flame at the center of the explosion?
How much light was there at the moment of the explosion?
How long should it be left on?
What is the amount and size of the debris?
Can you confirm the distortion of the air?
Was there any change in the surface of the earth?
How far do debris fly?
How does the prickly smoke dissipate?
How fast should I play the frames with the smoke of the texture sheet?
What is the difference between how big and small pieces fly?
How many types of smoke textures?
How many smoke textures are there?
Can the effect be used in scenes where this explosion class is required?
How much is the processing load?
Etc" (Chi Tian Gen, 2020)

Elements:

• color
• shadow
• Light
• Duration

the composition of the object itself
Force and movement of objects in motion
how objects disappear
The composition of the environment affected by objects
Influence between object elements

2.3.2 Production Details

From the above case, it can be concluded that observation needs to involve multi-angle analysis, and pay attention to all the phenomena that exist in reality as much as possible. In the production process, usually refer to pictures or videos, and modify the results step by step.

Observe the direction of force, In the production of special effects, it is common to create visual effects in which objects are destroyed.

In the process of visual effects produced by computer, it is necessary to set the force direction according to different production environments. For example, this object that slopes down from the sky hit the ground. From a realistic point of view, the stones on the ground receive pressure from the top, and then the ground gives the rock a rising force, causing the rock to fly off the ground.

But in the process of computer production, we only need to give the stone a force from the bottom to the top to simulate the effect of the appeal

Effects can be roughly divided into two types: photorealistic rendering and non-photorealistic rendering (NPR). NPR also includes stylize effects. Fully quoted.

In short, the producer not only needs to express the purpose of communication between the audience, but also needs to add a pleasant feeling.
In the expression of magic, it is also necessary to incorporate many physical laws such as fluid motion and inertia into the production, and the comfort of further effects is a crucial element. For the skill of how to master comfort, go through a good anime or game trailer frame by frame and implement it on the game engine.
In addition, slow motion is also a way to improve comfort.

For example, the air distortion generated when the missile is launched is a very impressive picture, but in real life, this picture is very short. At this time, if you increase this the number of frames of the picture can provide a (good) feeling, which is conducive to conveying the effect
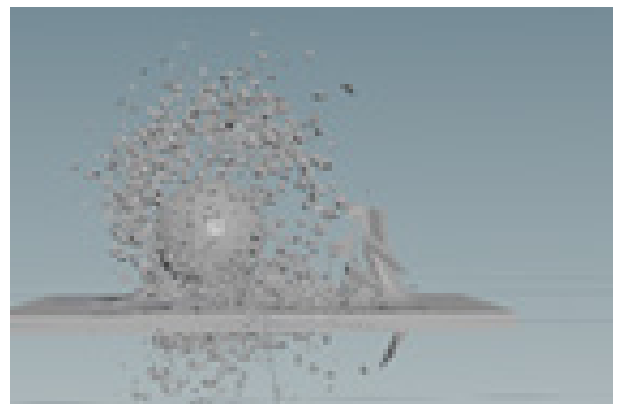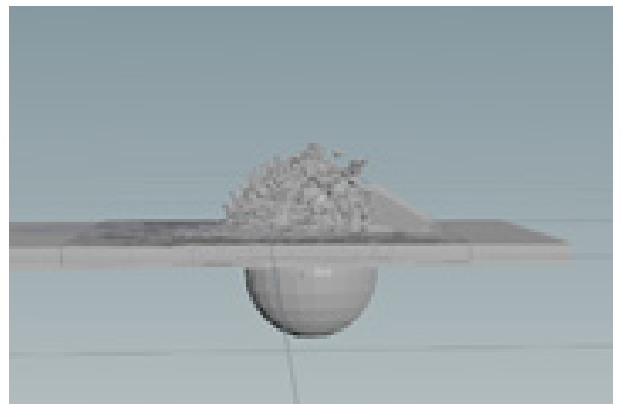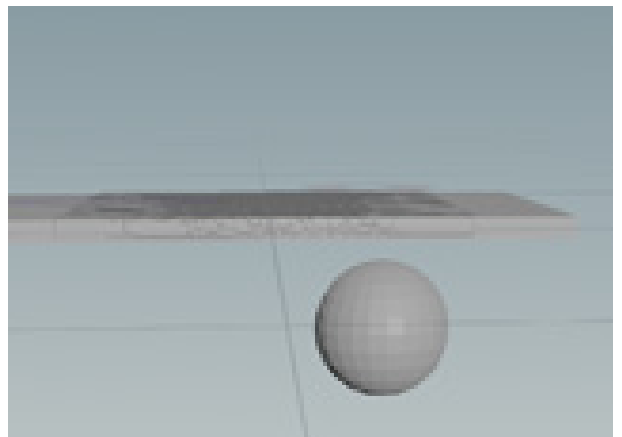
03 Case Studies

The analysis of these twenty films demonstrates the diversity and richness of storytelling in cinema.
 Some of these films are character-driven, while others are plot-driven. They explore different themes such as love, loss, power, and redemption.
 Some films focus on small-scale personal stories, while others tackle larger social issues. However, what all these films have in common is their ability to connect with audiences emotionally and intellectually.

3.1 Analyzing 20 Films

01 Snowpiercer

Snowpiercer is a 2013 post-apocalyptic science fiction action film based on the French climate fiction graphic novel Le Transperceneige by Jacques Lob, Benjamin Legrand and Jean-Marc Rochette.[01]
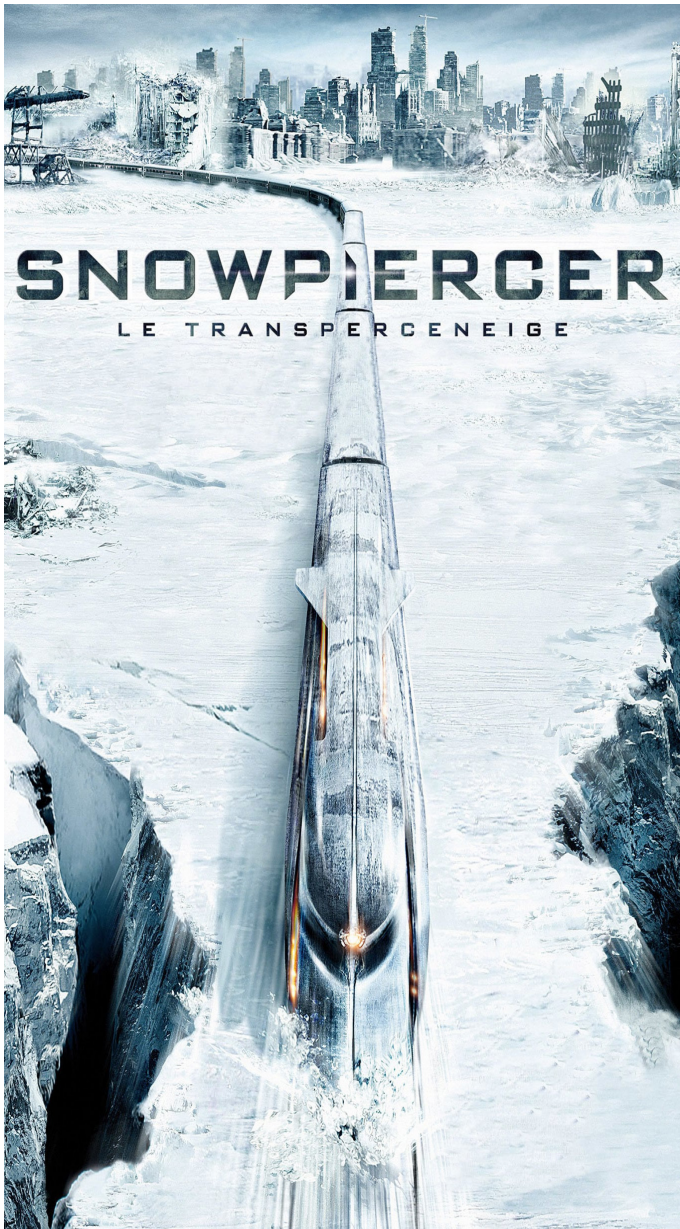
(02)

Background:

Because of global warming, humans launched CW7 coolant into the atmosphere to curb global warming, but "too successful" caused global temperatures to plummet and the world was covered in snowing

Plot:

The only remaining human beings ride in Noah's Ark-like train. It is a train that travels through the earth's orbit in perpetuity, and this train is self-sufficient. In the beginning, the inferior people started a life of cannibalism because of insufficient food. Later, the inferior people ate cockroaches to make protein blocks. The water source came from the ice and snow melted water from the front of the car. The parts of the perpetual motion machine needed children to act. The train that can run forever has two completely different lives, the people in the front section live in luxury, and the people in the back section are squeezed to start a rebellion, so that 74% of the passengers in the rear car are killed in the process of suppression, so reduce the population of the train for maintaining a closed ecosystem. The top leaders on the train planned a rebellion to reduce the population, but the explosion of the rebellion caused an avalanche that derailed the train and people left the wreckage. Last surviving person sees a polar bear in the distance, suggesting life still exists in the outside world

Conflict:

The son of an inferior was taken away and the inferior were punished at will by soldiers
Resist of the inferior and repression of vested interests
The scarcity of resources and the harsh environment encountered by the train
The truth of cannibalism was discovered, because maintaining the ecological balance of the train needs to limit the number of humans inside

02 The Wandering Earth

Background:

The sun is going to die, the story of human beings transforming the earth into a huge aircraft, escaping from the solar system and looking for a new home

Plot:

Human beings live in dungeons, use the earth's resources and the traction of other planets to push the earth to fly, and fly to the Sagittarius constellation galaxy to gain a new life

Conflict:

People began to think that leaving the solar system was a conspiracy of the coalition government, organized rebels, resisted the government army, and wanted to prepare to return to the solar system

(03)

03 Avarya

Background:

Earth is polluted, humans board spaceships hoping to find a new habitable planet, and humans are trapped in their own spacecraft after robotic supervisors find every candidate planet unsuitable.

Conflict:

The robot housekeeper sticks to perfect rules, and people can't settle on the planet they want to go to. Or find a way to let the robot let it go to the planet it wants to go to, or how to escape the butler's logical infinite loop
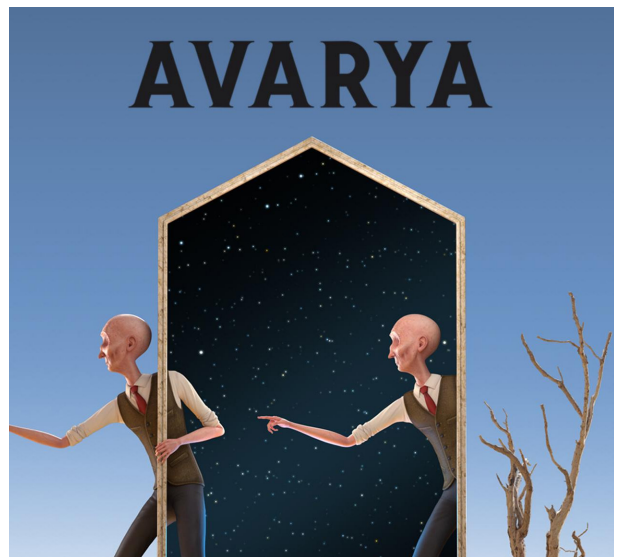
(04)

01.   From Wikipedia, the free encyclopedia.
02.   Snowpiercer - Film (2013) - MYmovies.it
03.   The Wandering Earth' floats to No. 1 at Chinese box office - CGTN
04.   Enjoy 'Avarya' in the unique format on CINE-BOOKS.com

(01)

(02)

(03)

04 *I Am Legend*

Background:

Massive virus contagion,

Plot:

The protagonist develops vaccines, uses mice for experiments, and transforms virus-infected people into normal people

Conflict:

The death of the dog, the loneliness of life, the battle with the infected, Thoughts on who is on the side of justice

05 *Mortal Engines*

Background:

After the war, the world was destroyed, and a thousand year later, it developed into a mobile city loaded with giant ships. In a cruel future world, they hunted each other until they died.

Plot:

Super weapons are taken by bad guys, how to stop bad guys from conquering the world

Conflict:

The protagonist's hard revenge, saving innocent people,

06 *Mad Max: Fury Road*

Background:

The future world, oil, and water shortages has caused continuous wars. People are fighting each other for limited resources

Plot:

 A journey of escape, to save the woman who was forcibly plundered by the boss, to pursue freedom * hope

Conflict:

 Can the hero find an oasis, and how to escape the boss' control

KODI SMIT-McPHEE   RYAN KWANTEN

2 0 6 7

07 2067

Background:

The earth has been devastated and the survivors are all plagued by the same disease

Plot:

This company created a time-space transmission device; the machine received a message from the future, the content named the character to go to the future to find a way to save the world
In the end, the protagonist sent the plant back, and the plant was copied, saving mankind

Conflict:

The danger of teleportation, the hero seeing his own corpse,
The hero and his companions are suspicious of each other, abandon the majority to save the few, or find a better solution to save everyone

01.   I Am Legend, 2007, American post-apocalyptic action thriller film, Directed by Francis Lawrence
02.   Mortal Engines is a 2018 steampunk film directed by Christian Rivers
03.   Mad Max: Fury Road is a 2015 Australian post-apocalyptic action film co-written, co-produced, and directed by George Miller.
04.   2067 is a 2020 Australian science fiction film

08 Automata

Background:

The earth's environment has been greatly damaged, and human civilization and beliefs have collapsed uncontrollably. At the juncture of chaos, a technology company named ROC rose rapidly with the "Pilgrim 7000" intelligent robot they developed.

Plot:

The robot has self-awareness, begins to fight, and seeks development. The robot does not want to be controlled by humans anymore, nor does it intend to overthrow the rule, but chooses to stay away from humans.

Conflict:

When all robot consciousness awakens, the uncertainty of the human future

09 Oblivion

Background:

From the destruction of the moon to the ecological collapse of the earth, the unknown alien machine "cone ship" invaded the earth to control the world

Plot:

Human struggle, finally eliminating aliens, sacrifice for love, justice and saving mankind

Conflict:

What you see is not necessarily the truth
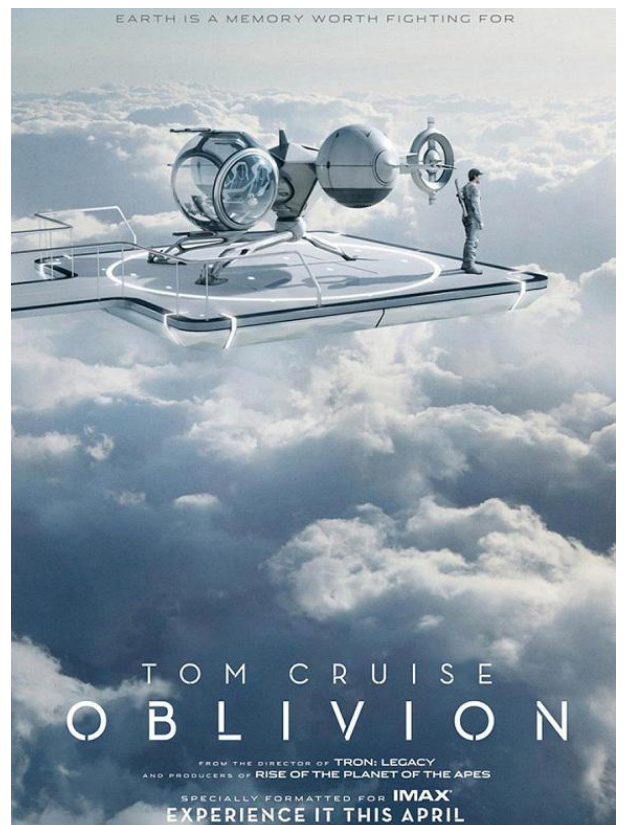
01. Automata (Autómata, 2014, diretto da Gabe Ibáñez.
02. Oblivion, 2013, American post-apocalyptic action-adventure film, produced and directed by Joseph Kosinski
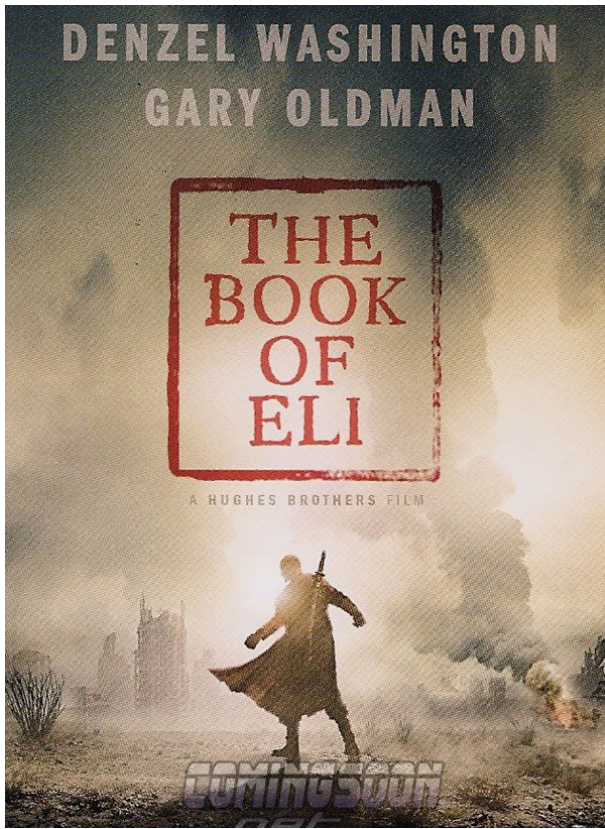
(03)

10 The Book of Eli

Background:

After the big bang, the world was like a desert. When people and the land were almost unproductive, some people hijacked passers-by for a living; some formed a motorcycle snatch team, and some survived by eating human flesh.
Carnegie controls water,
Become the ruler of the town

Plot:

Whenever the locomotive snatch team snatches it back, it must report to Carnegie and give him the robbed "book" in exchange for a meal and wine. Carnegie, he is the spokesman of "knowledge is power",
He mastered civilization and knowledge before the big bang, and mastered the water source, but he understood that "violence" cannot rule the world after all, and only the "correct language" can rule the world.
Discover the only remaining Bible in the world

Conflict:

 lack of faith.

(04)

11 Sunshine

Background:

The sun is about to go out, and man is going to light the sun

Plot:

Solar Rescue Team". A spacecraft called "Icarus II" dashed quickly towards the hot sun. Their mission was to deliver nuclear warheads and reignite the dying sun.

Conflict:

 Technical failure of the ship, the appearance of monsters, the decision of who to sacrifice

03. The Book of Eli, 2010, American post-apocalyptic neo-Western, action film directed by the Hughes Brothers
04. Sunshine, 2007 science fiction psychological thriller film, directed by Danny Boyle
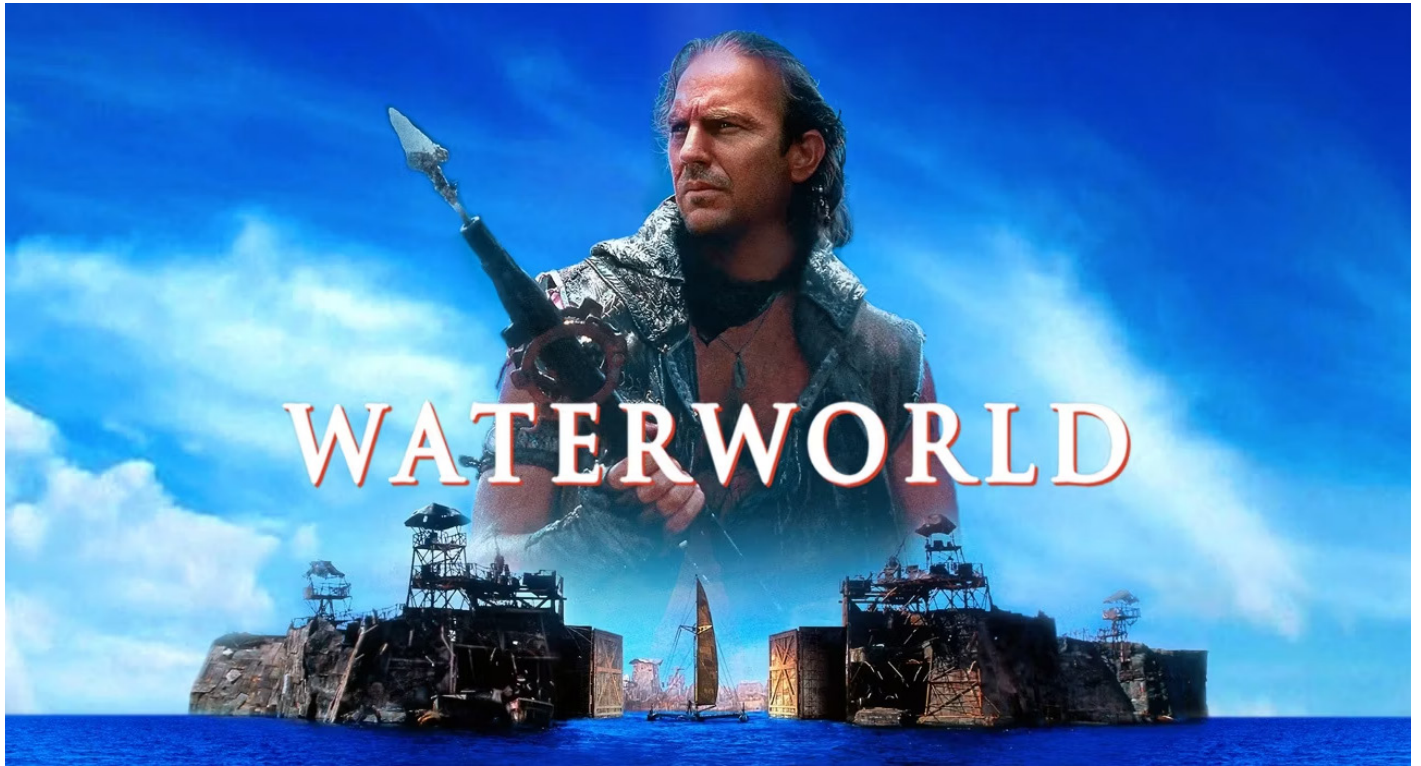
12 Waterworld

Background:

At the beginning of the 21st century the polar ice caps melted and sea levels rose, covering every continent on Earth. Surviving humans are scattered across the ocean in rudimentary floating communities called "atolls" built from scrap metal and dilapidated sea vessels.
In the not-too-distant future, many people still cling to the myth of the "dry land", even though land-based societies have finally been forgotten.

Plot:

The story of finding land
Pirates are looking for an orphan named Enola, who is believed to have a dryland map stabbed in her back. The "Deacon", the leader of the androids, believed that with a map, he could reach dry land and build a city on it.
Discover dry land - Mount Everest, full of verdant greenery and fresh water, forests and wildlife. Gregor, Enola, Helen and other atoll survivors find a cabin left by Enola's parents.

Conflict:

Mutants are not accepted by humans and are about to be killed. Humans can't allow people who are too much stronger than themselves to exist. The resources inside the pirates can't keep up with the rapidly expanding desire. The oil is running out.

14 Elysium

Background:

In 2154, the world's richest dignitaries collectively migrated to the well-equipped man-made universe city "Elysium", while the rest of the civilians continued to live in severe pollution, disease rampant,
In a world where crime is prevalent, death threats are faced almost all the time
. Elysium is equipped with a "Med-Bay" that can cure any disease, reverse the aging process, and regenerate cells. Civilians all over the earth are eager to see the space station. After several years, they broke into the space station by illegal immigration.
Use the hospital bed briefly to treat yourself or your children. In order to ensure the living standard of the residents of the space station, Jessica Delacco, the Minister of Defense of Elysium, strictly prohibits any earth civilians from entering the space station, and any civilians who invade the space station will be expelled or shot by her.

Plot:

The protagonist is dying because of radiation, so he needs to borrow a medical bed, a med-bay. Fighting the main character is dead Another bro immediately modified the system to turn all the people of the earth into citizens of Elysium. Frey used the medical bed to cure Matilda and the mother and daughter were reunited. The spider also sent a large number of emergency ships with medical beds to all parts of the earth to start treatment. Every sick child and other civilians

Conflict:

The conflict between the rich and the poor, the struggle for power
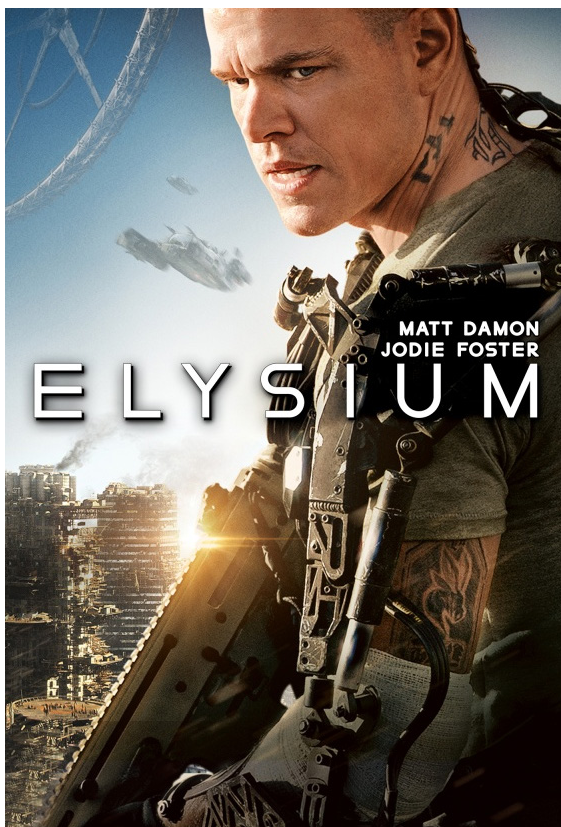
(02)

01. Waterworld, 1995, American post-apocalyptic action film, directed by Kevin Reynolds
02. Elysium, 2013, American dystopian science fiction action film, written, produced, and directed by Neill Blomkamp

(01)

13 Interstellar

Background:

The earth is about to be destroyed,

Plot:

A group of explorers takes on the most important task in human history:
Go beyond known galaxies and search for the possibility of humanity's future in interstellar space. Break through the limits of science, travel through "wormholes", and search in space
Changed the fate of human beings, created a new world of the space station, and human beings live in a 360-degree arc-shaped gravity world

Conflict:

The power of love. Affectionate. The significance of Interstellar is to put science fiction and human emotions together
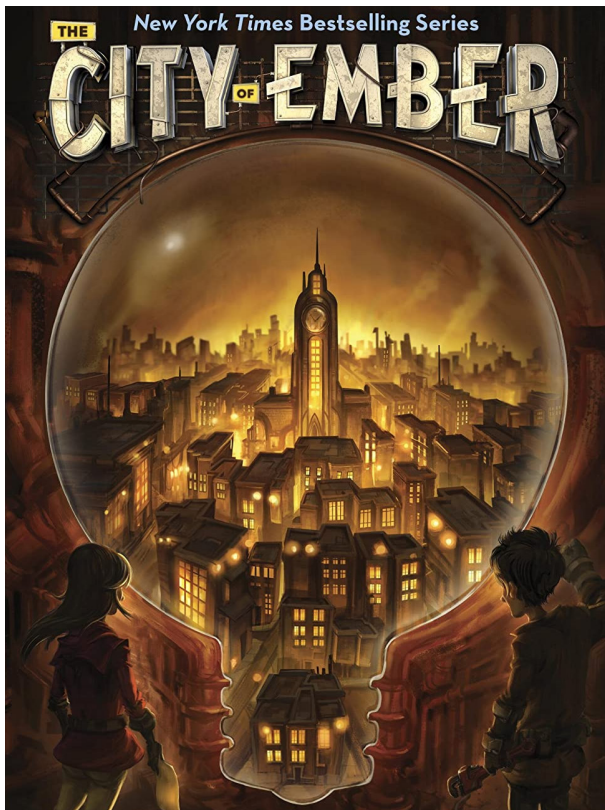
(02)

18 City of Ember

Background:

Shimmer City is a fully functional city built underground 200 years ago in order to avoid certain disasters.
200 years later, the box opens and the city gradually collapses
However, because a certain mayor did not disclose the existence of the box before his death, the news disappeared after his death.
The story of how the male protagonist walked out of Shimmering City and how to save mankind drama

Conflict:

The secrecy of metal boxes; the gradual breakdown of urban systems designed two hundred years ago; the greed for power of existing city controllers

01. Interstellar, 2014 epic science fiction film, co-written directed, and produced by Christopher Nolan.
02. City of ember, 2008, American science fantasy adventure film, Directed by Gil Kenan

15 *Equilibrium*

Background:

After the third world war, the world is in ruins, preventing the tragedy from repeating,
Humans established a country called Libya, advocating that the reason for the war in the world is derived from the innate emotions of human beings, which lead to all the sadness, anger, killing, and disputes between people, because of the overflow of emotions. lead to.
Humans are injected with drugs to eliminate short-term emotional fluctuations every day, and cannot keep calligraphy, painting, music, pets, etc. In this way, the citizens will become bloodless and tearless creatures, and they will not be shaken by it in any event.

Plot:

The rebel organization and the government's gaming, Finally the government was overthrown

Conflict:

The unsustainability of suppressing human emotions, and the resistance to unreasonable state institutions
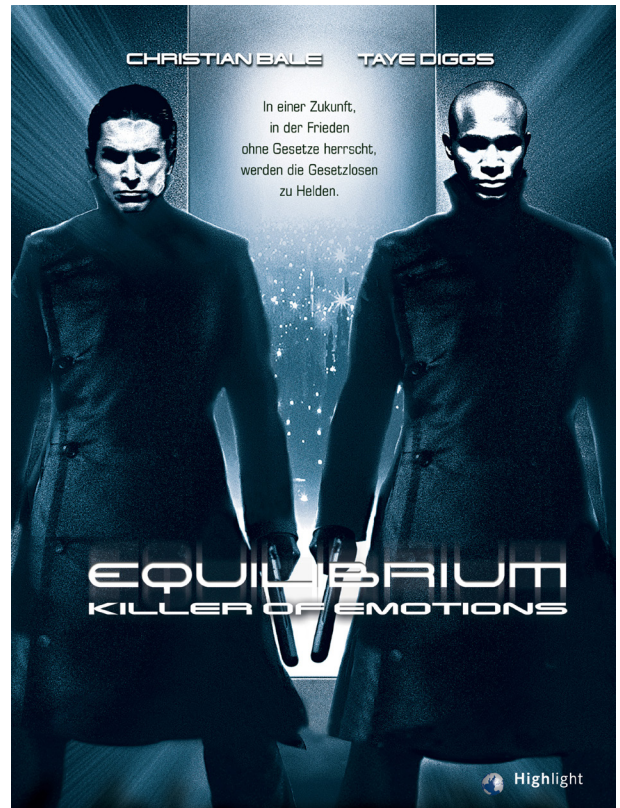
(03)

16 *The Road*

Plot:

An unknown disaster wiped out most of civilization; almost all life has disappeared. In this barren world, a father and son (Viggo Mortensen and Cody Smith-McPhee) keep going south, looking for a chance to survive.

Conflict:

The earth can no longer produce new materials; it can only find existing food
Father and Son's Difficult Survival in the Doomsday
Cannibal Survival Options
Desperate reality and the struggle of survival instinct

03. Equilibrium, 2002 American science fiction film, written and directed by Kurt Wimmer
04. The Road, 2009, American post-apocalyptic survival film, directed by John Hillcoat

(04)

19 Life of Pi

Background:

When Pi was 16 years old, his father decided to move the family to Canada to settle down and had to sell the animals. A family takes animals aboard a Japanese cargo ship. The story of the ship encountering a storm and then struggling to survive

Conflict:

More importantly, it allows the audience to see the impact of morality and law when people are in a desperate situation. Faith and Doubt

20 Children of Men

Background:

In the near future, due to inexplicable reasons, human beings will not be able to have the next generation. At this moment of complete despair, a pregnant black woman was suddenly discovered, so she and Dio, the male protagonist entrusted by his ex-wife to help protect them, became the target of all parties.

Conflict:

Aging Thinking a Hopeless Future? The spirit of self-sacrifice and concern for the overall destiny of mankind Criticism of reality
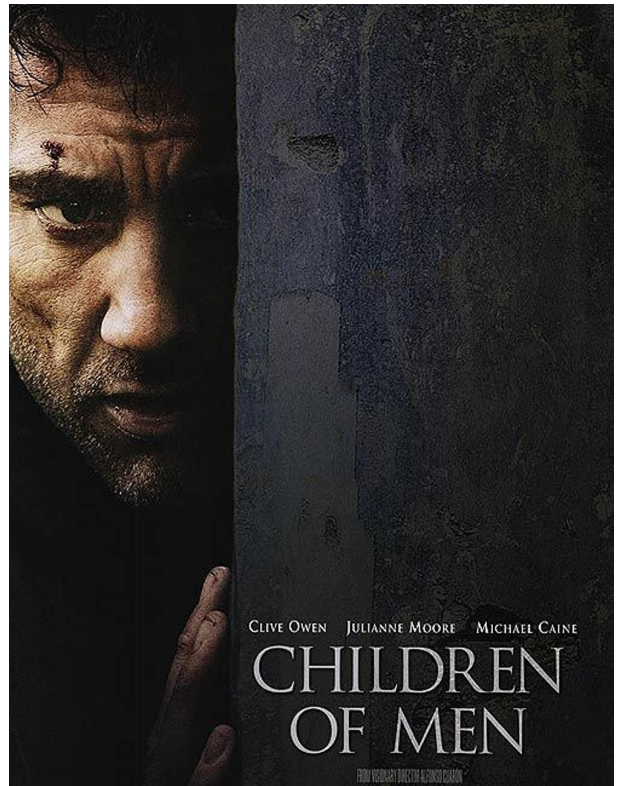
01. Life of Pi, 2012, adventure-drama film, directed and produced by Ang Lee
02. Children of men, 2006, dystopian action thriller film, co-written and directed by Alfonso Cuaron.

3.2 Deeply Analyzing a Film

3.2.1 Tolerantia and Timeline

Tolerantia
This story describes the development of human beings and how humans destroy themselves because of different beliefs

1.The barbarian comes out of an ice cube

2.This barbarian watches the giant stone
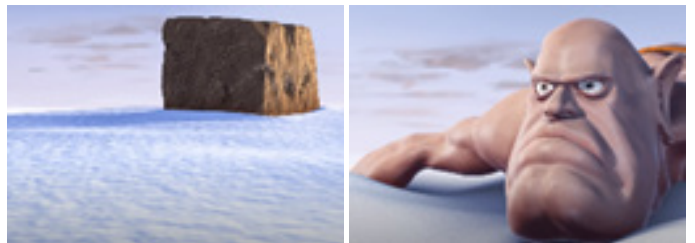
3.He is building the "castle"
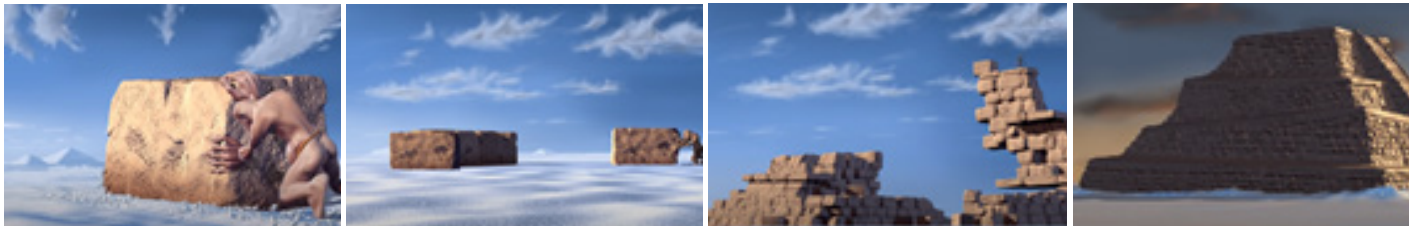
4.He creates the totem/belief
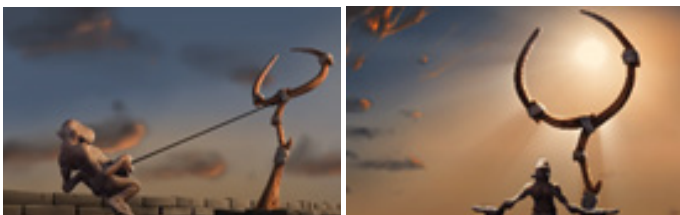
5.There is another one barbarian who has different belief
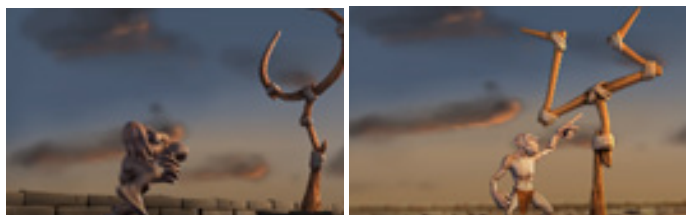
6.The conflict of belief
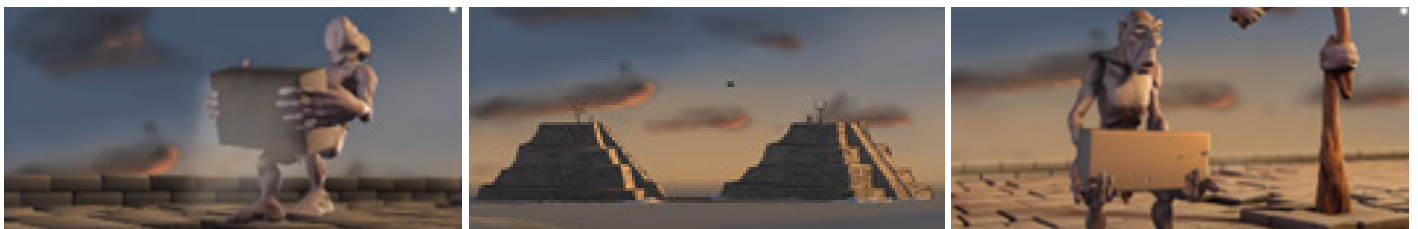
7. The Conflict of belief
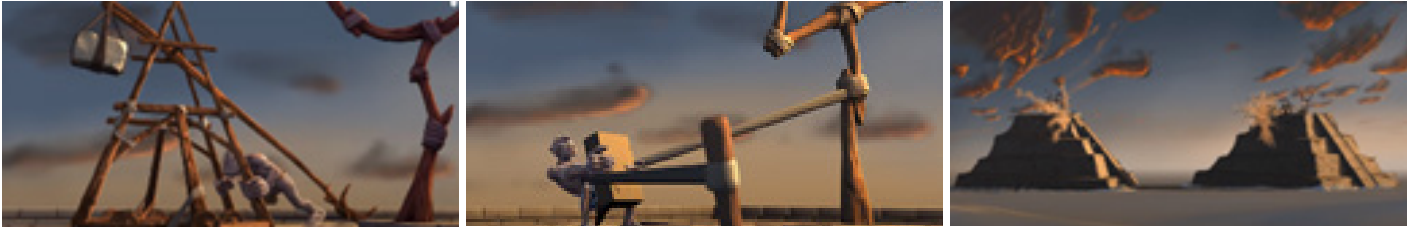
8. They kill from each ohter by stones (Ending)
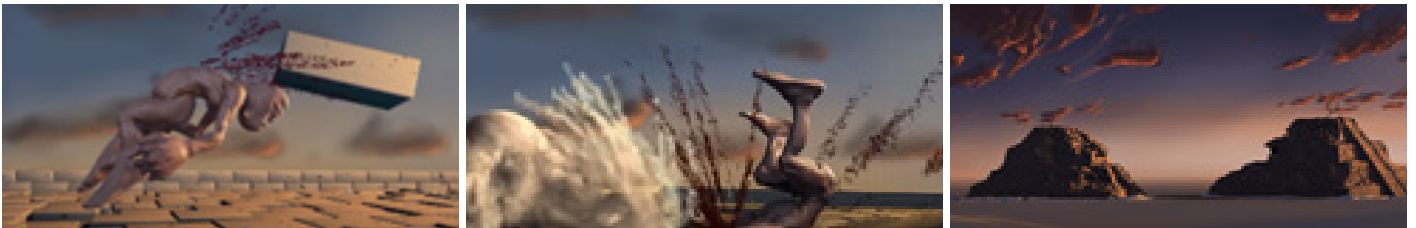
3.2.2 Elements and Connection Chart

The barbarian

The most obvious feature of a barbarian are the big hands. The reason is for being able to build the castle and for fighting

Stone

It's not only the foundation of castle, but also is the part of weapon, and this shape of stone is good for making up castle

Castle
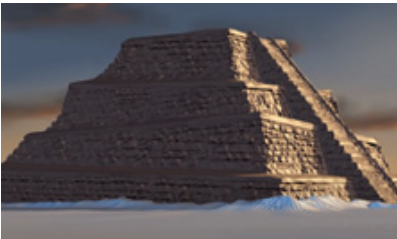
The shape that promotes the castle means the tech level up. And barbarian gets more assets

The totem
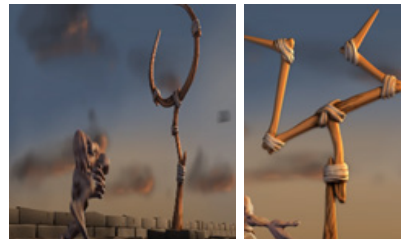
It seems can bring something to the barbarian, but finally bring death to them. The style of second totem is more aggressive

Weapons

Barbarians attack each other with stones and furthermore, the belief is part of the weapon.

40

Connection chart
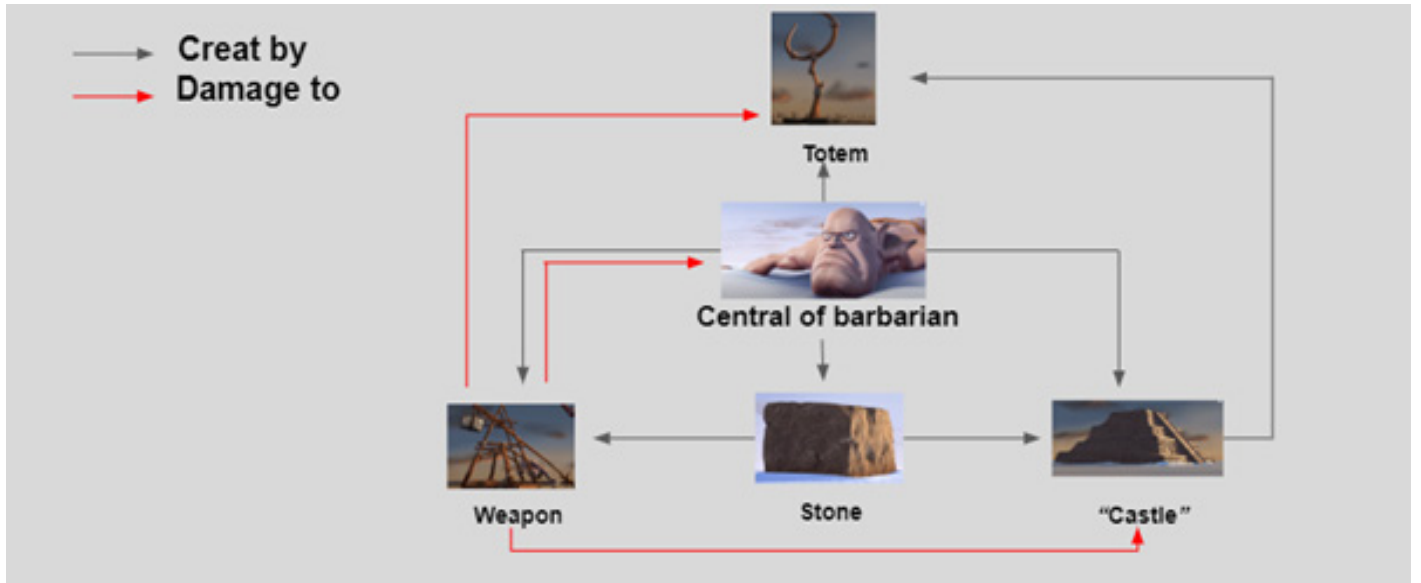
It consists of five elements that make up this story structure; the barbarian is at the center of the story structure
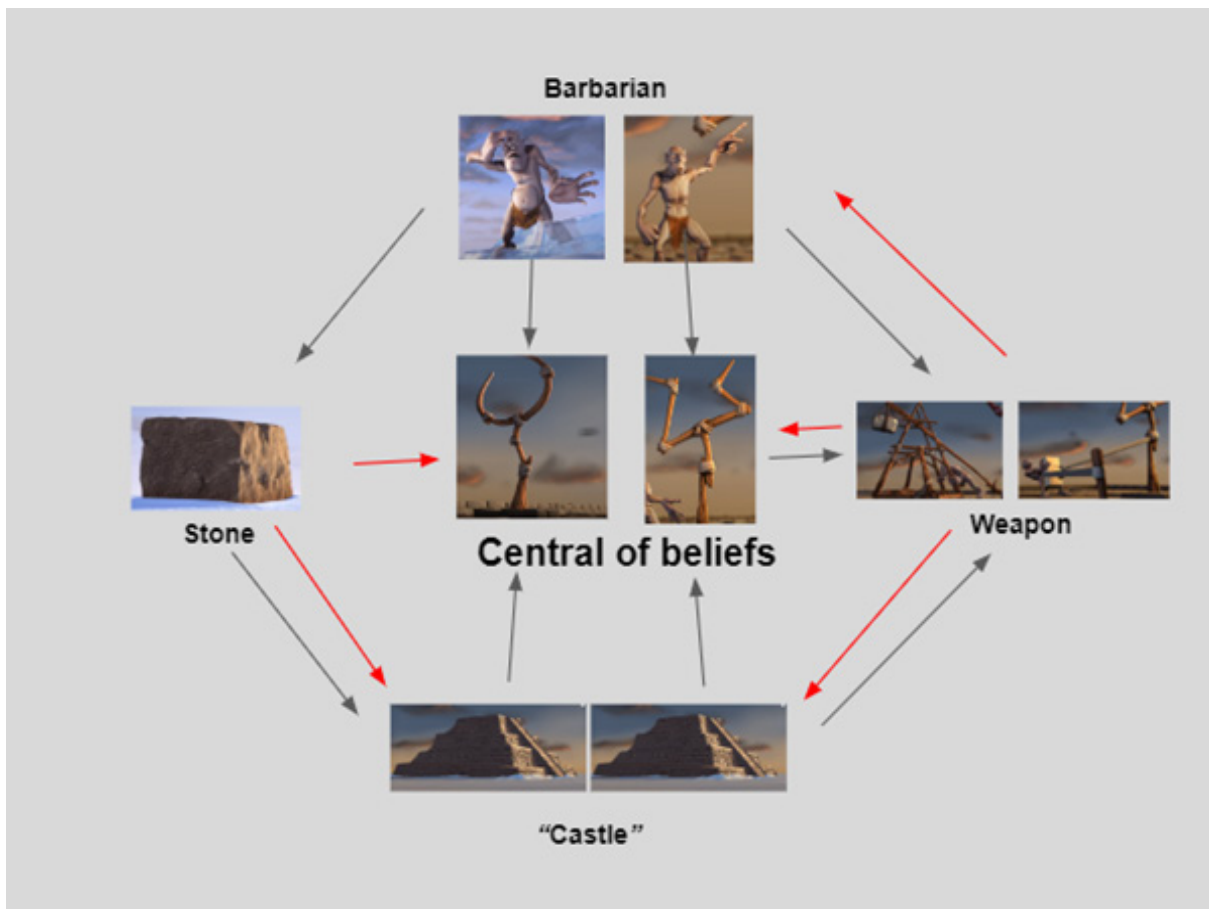
The concept about belief. They get benefit from the belief, also them die by beliefs

3.2.3 Discover my script

Script The story of scramble the energy by 2 robots
The robot comes out of "base"
This robot watches the "energy"
He collects the energy for base
The base and robot level up by energy
He is seeking the energy again, but meets another one robot; they both show the kindness to each other.
But they fight for the energy ball , beginning of war
They both run out of the energy and die

Concept of story

The concept about energy
Robots get power from the energy
Also, them die by energy
It consists of five elements that make up this story structure, the energy is at the center of the story structure

relationship-five elements

04
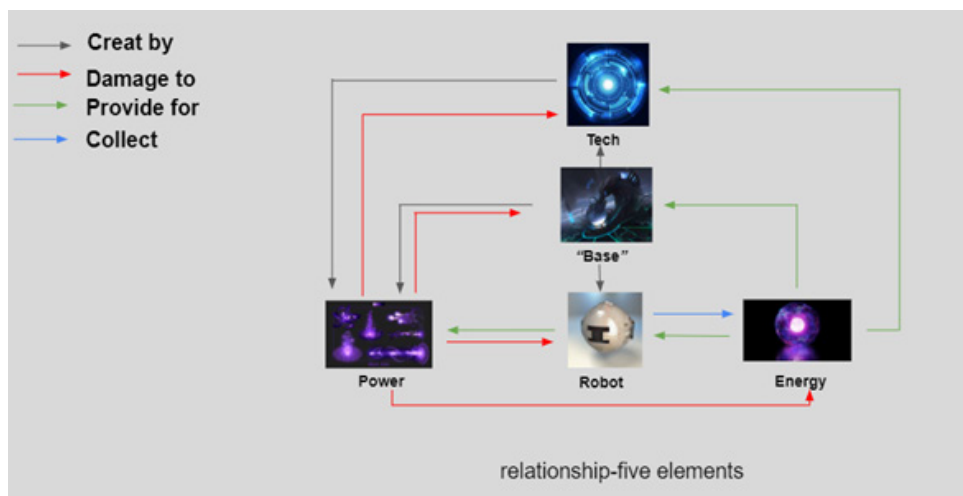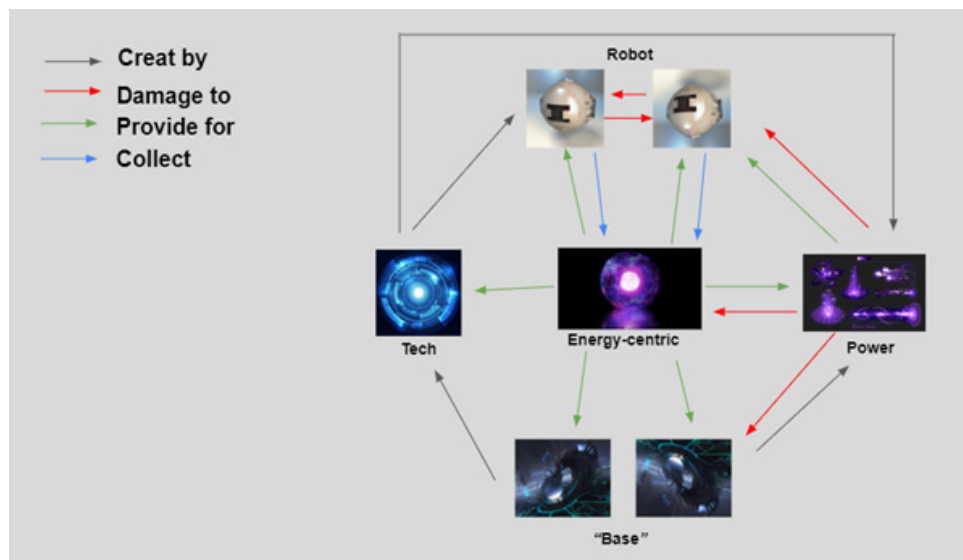
The designing of my video

Visual effects can be an incredibly powerful tool for communication, helping to convey complex concepts, enhance emotional impact,
Create immersive environments, add emphasis, and create memorable moments.
By leveraging the power of VFX, filmmakers, marketers, educators, and others can create more engaging and effective communication materials that resonate with their audiences.
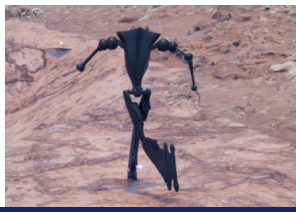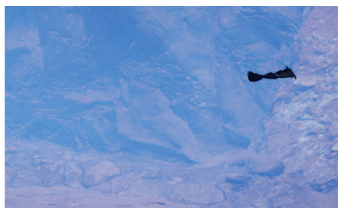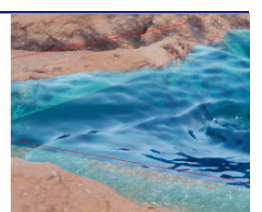
4.1.1 Storyboard

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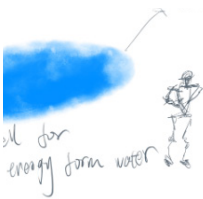

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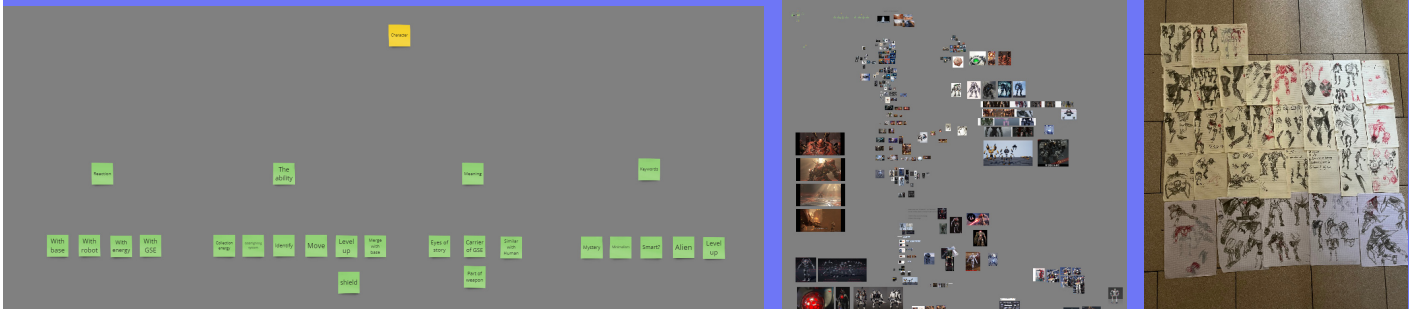13

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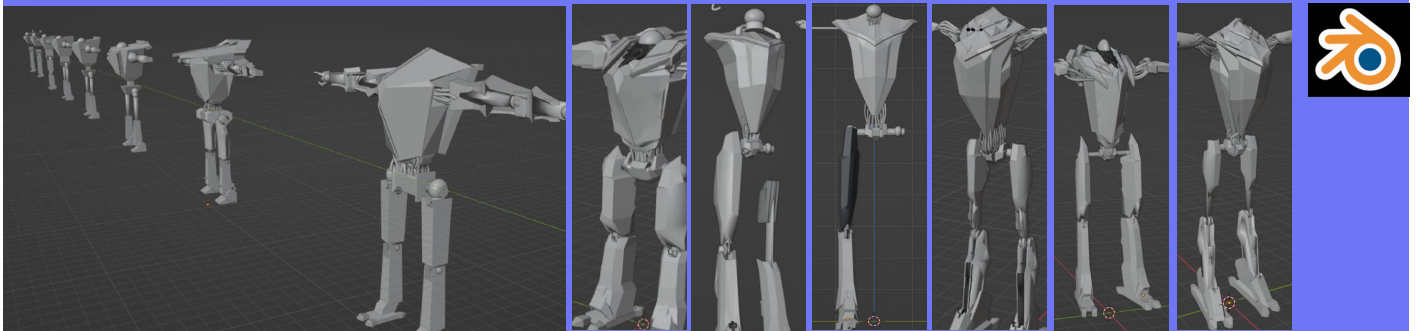18
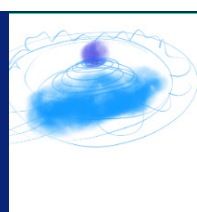
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4.1.2 Character Design

Prepare working-3D model- Animation-Shader
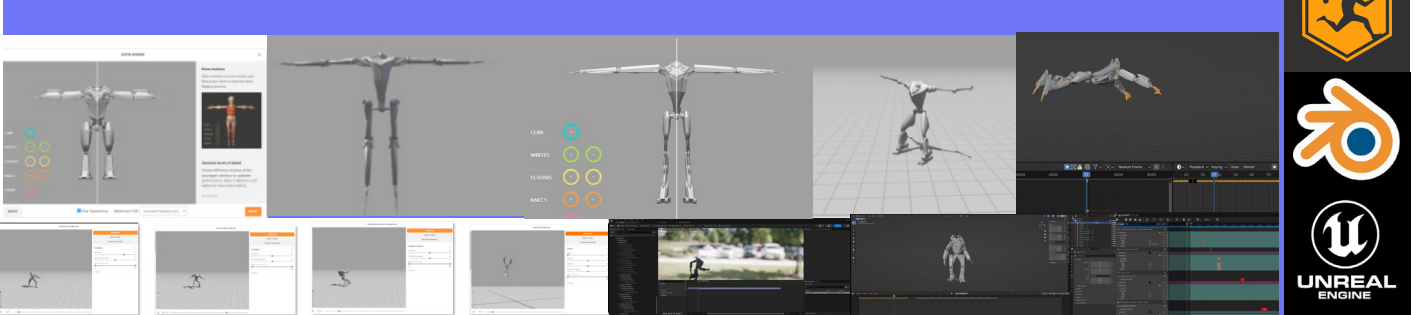
Prepare working

3D model

Animation

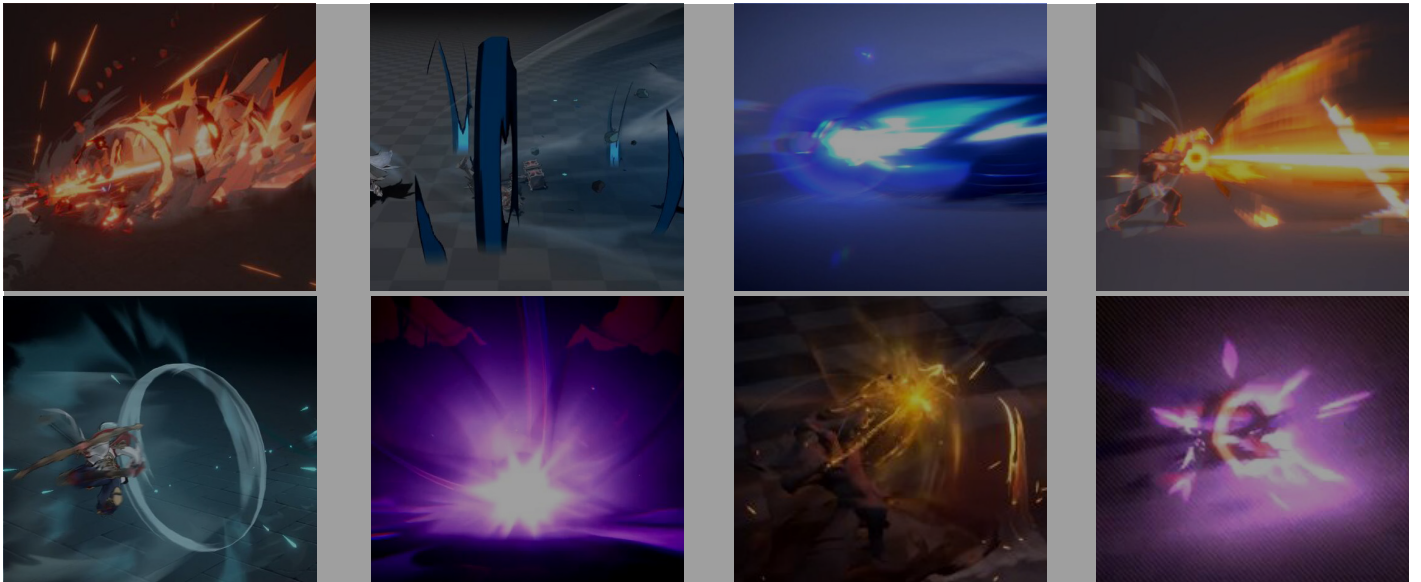## Shader

4.1.3 Visual Effects Design

4.1.3.1 Design Process

1.Purpose: Attack Lazer

2.Script:
A.Sphere absorbs energy from the environment.
B.Sphere explodes.
C.Sphere transforms into a super-sphere.
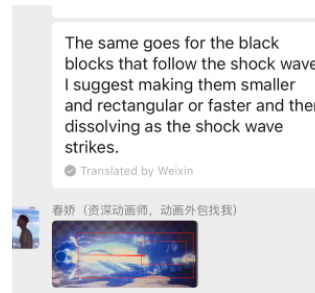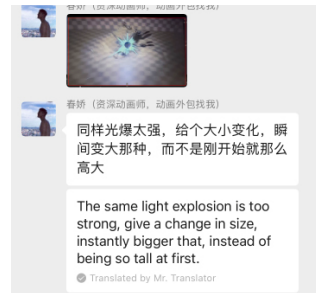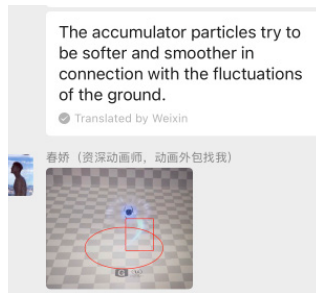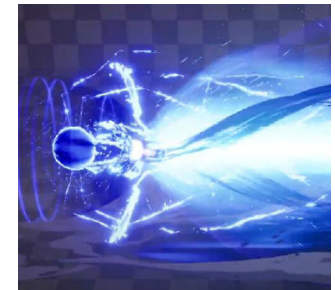D.Super-sphere causes laser beam.

3.Reference

4.Do it

5.Modify

6.Communicating with VFX Artists and Seeking Their Advice

The accumulator particles try to be softer and smoother in connection with the fluctuations of the ground.

春娇（资深动画师，动画外包找我）

同样光爆太强，给个大小变化，瞬间变大那种，而不是刚开始就那么高大

The same light explosion is too strong, give a change in size, instantly bigger that, instead of being so tall at first.

The same goes for the black blocks that follow the shock wave. I suggest making them smaller and rectangular or faster and then dissolving as the shock wave strikes.

春娇（资深动画师，动画外包找我）

This layer of energy cover is black to the same color as the wave, but it needs to be light and then pressed with a translucent color, which can also give a point size or texture change.

春娇（资深动画师，动画外包找我）

7.Modify again

4.1.3.2 Modify Design Process

Due to I realized that my production process had major issues, I wasted a lot of unnecessary time and energy, and the final outcome was not good. There-fore, I should go and modify my production process.

Pre-production:
1. Write a simple script.
2.Find at least ten visual effects references, break down the reference elements, and mark the parts worth extracting.
3.Write a complex script with accompanying visual effects settings (such as the visual representation of black hole collapse that aligns with the overall expression). Also, write down the key points that should be presented in the visual effects (such as the energy absorption effect of the black hole and the presentation of wind should show a circular motion trajectory and a decreasing size).

Production:
4. Create the overall visual effects framework, such as creating a space distortion first, then creating simple black and white elements. This step completes the overall rhythm framework.
5.Render the overall framework, repeatedly watch and adjust the time changes of the production framework, and whether the rhythm of the fast and slow composition is reasonable. Also, check if the overall visual effects elements are properly impacted.
6.Add element composition and details.
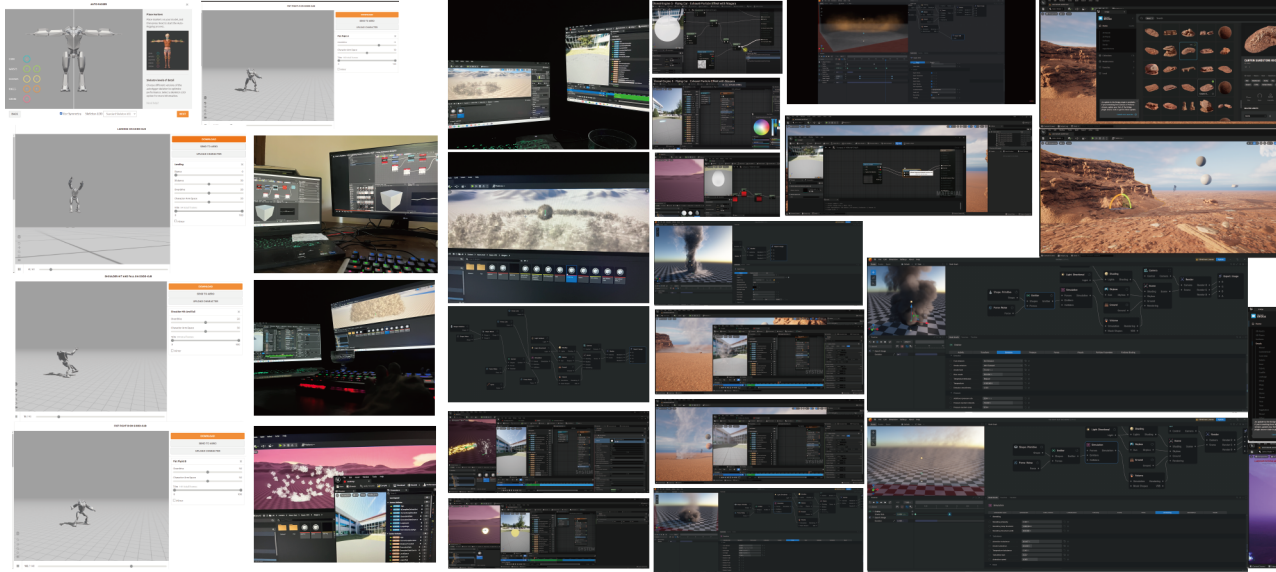
Post-production:
7. Communicate with visual artists to obtain feedback and advice for modifications.
8.Make modifications.
9.Complete.

4.2 Screenshot of Timeline
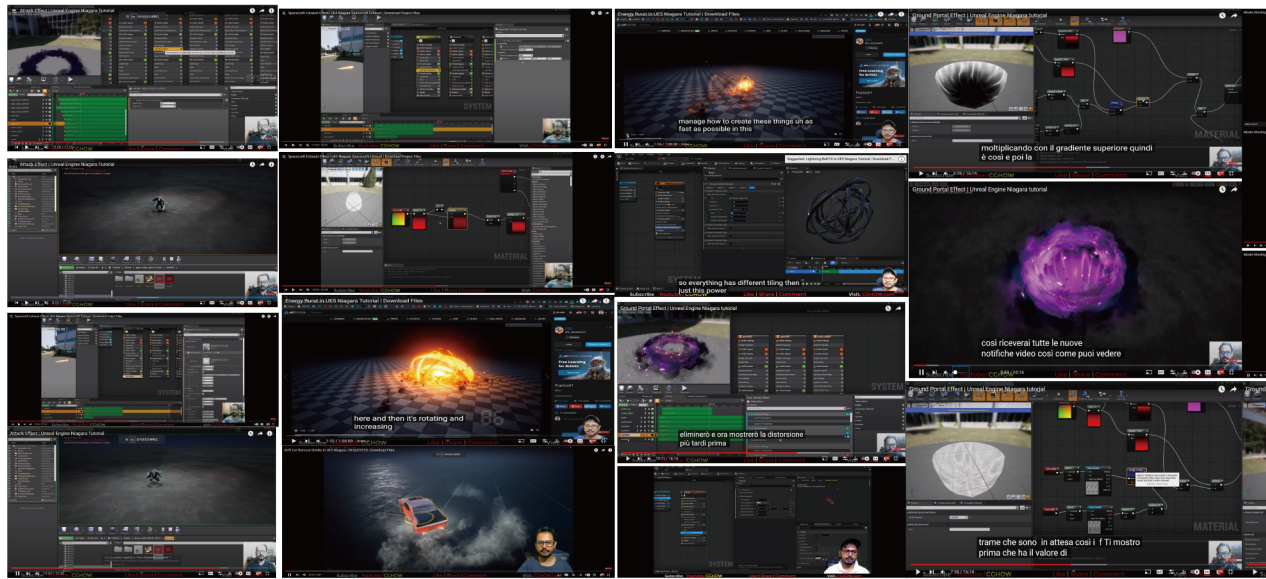
Timeline	Process	
	Tutorial	
	References	

07/2022
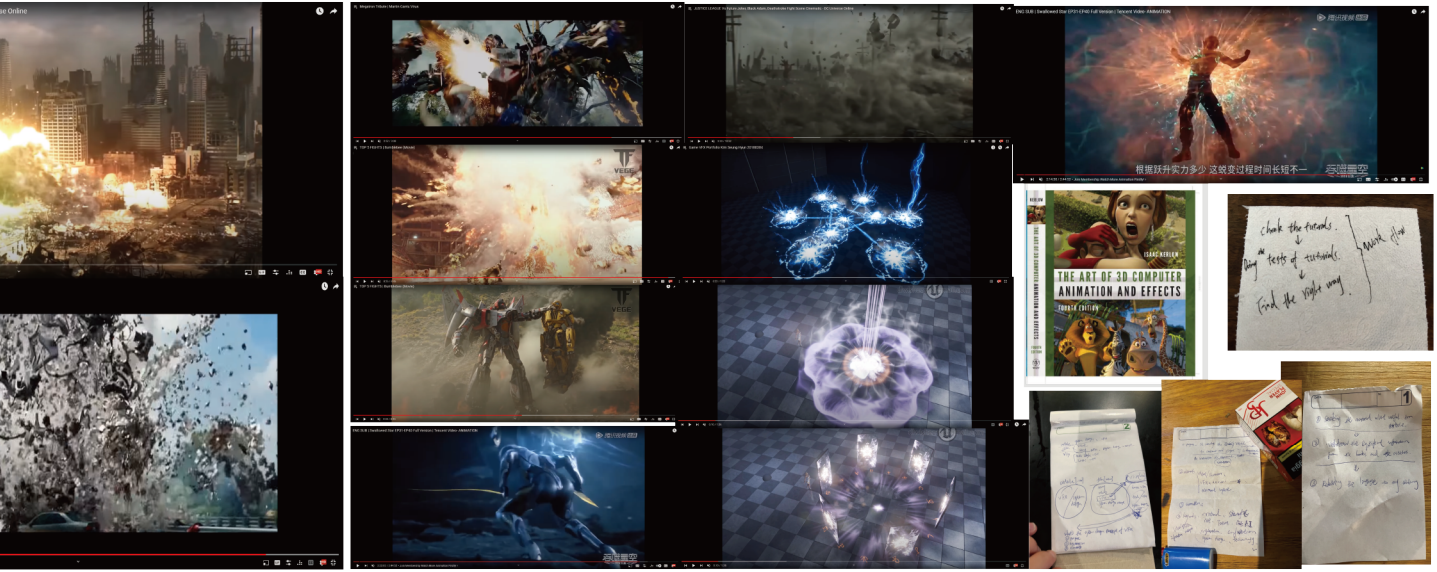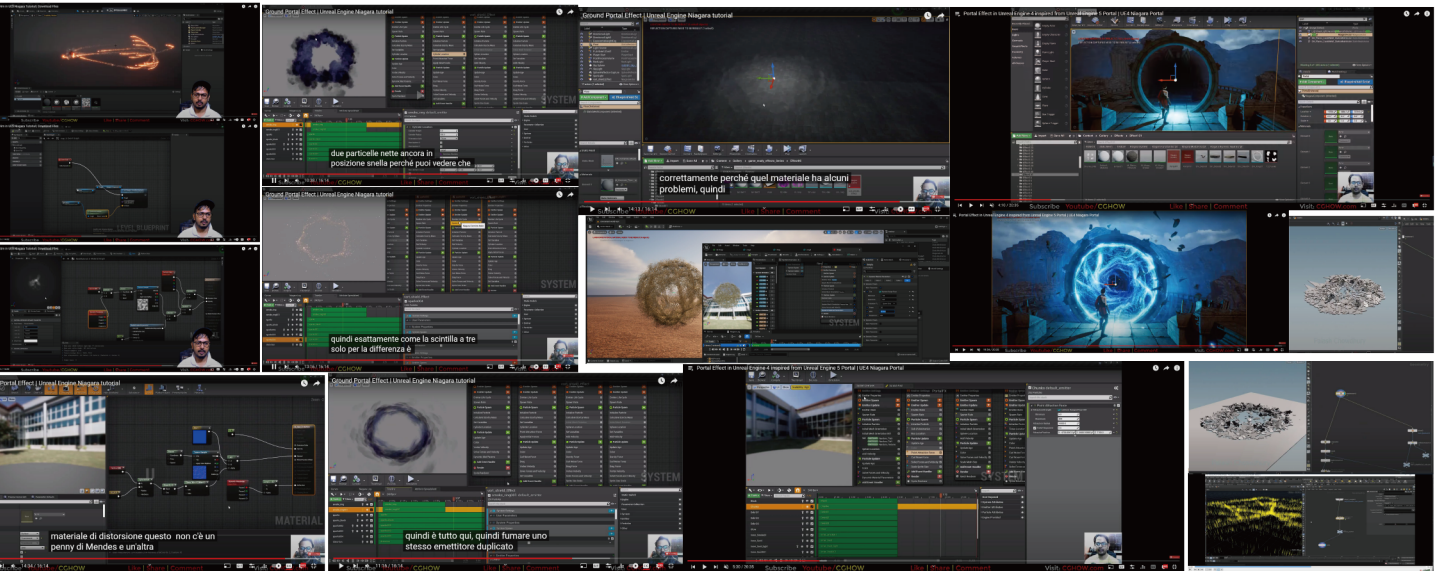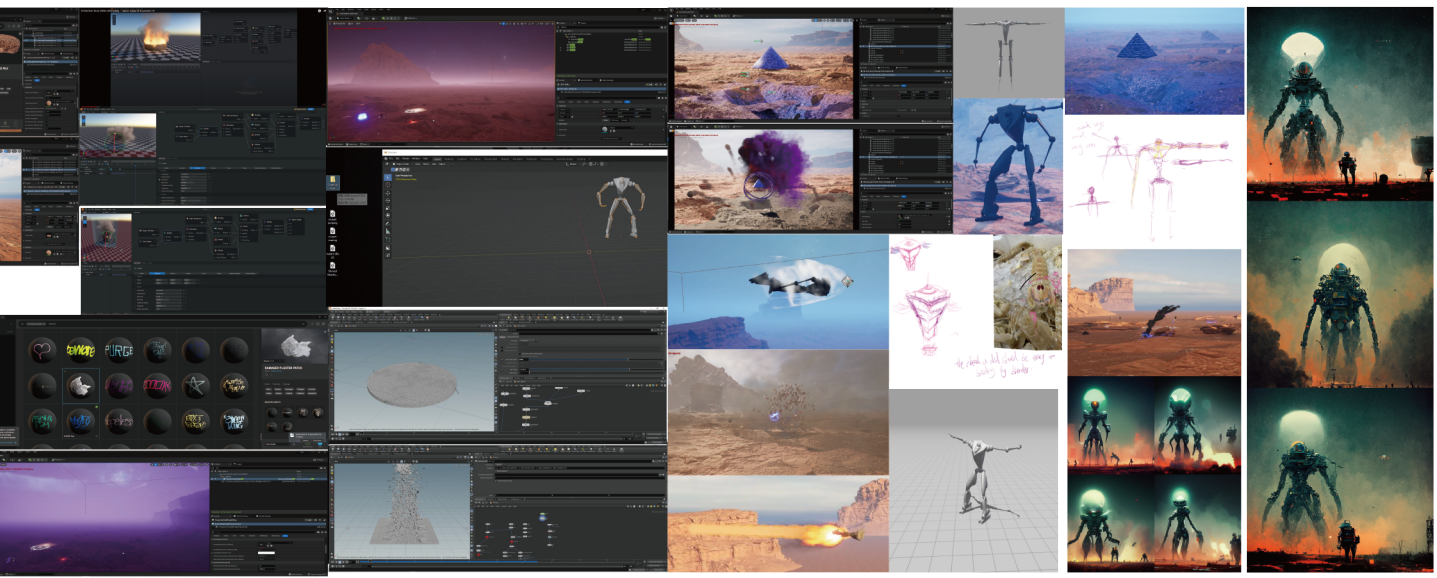
Timeline

Process
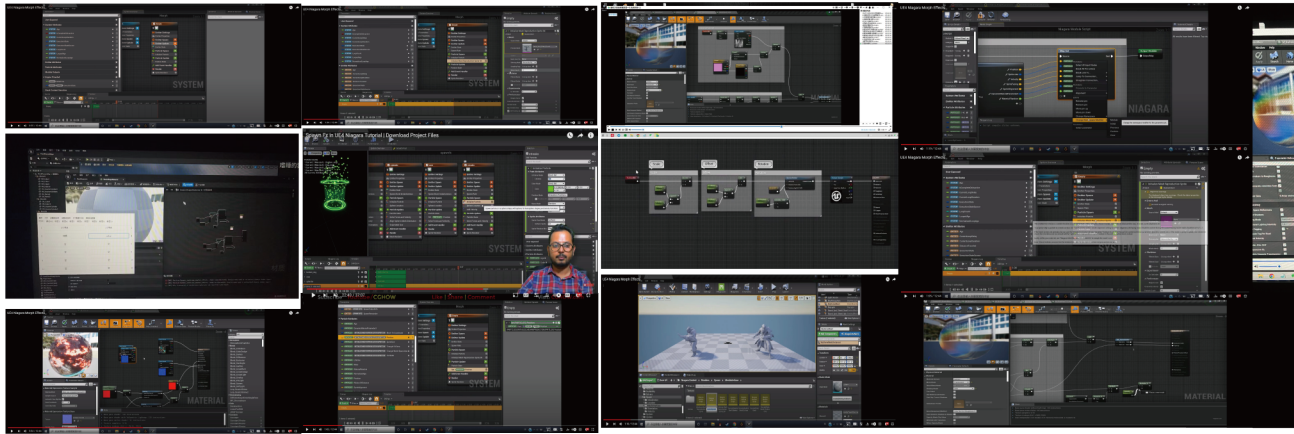
Tutorial
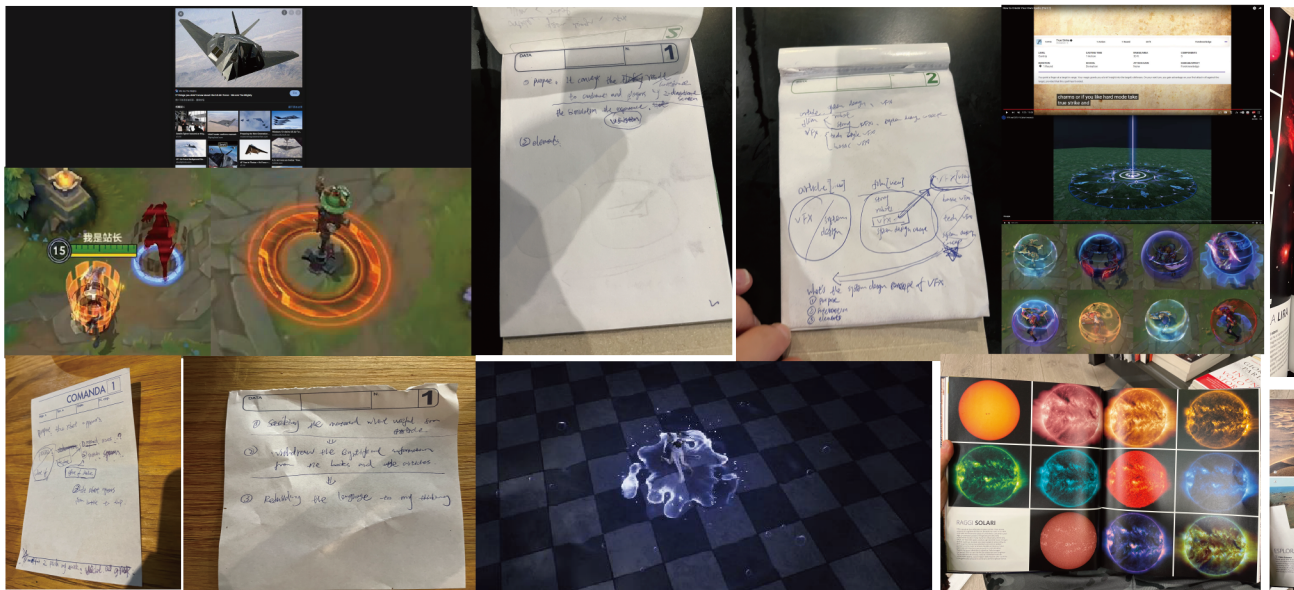
References

09/2022
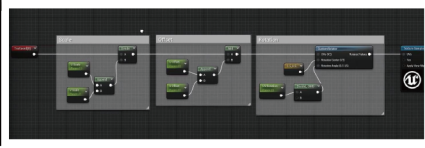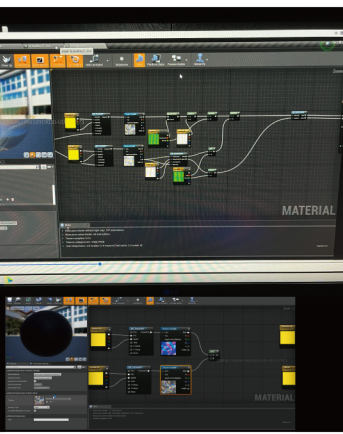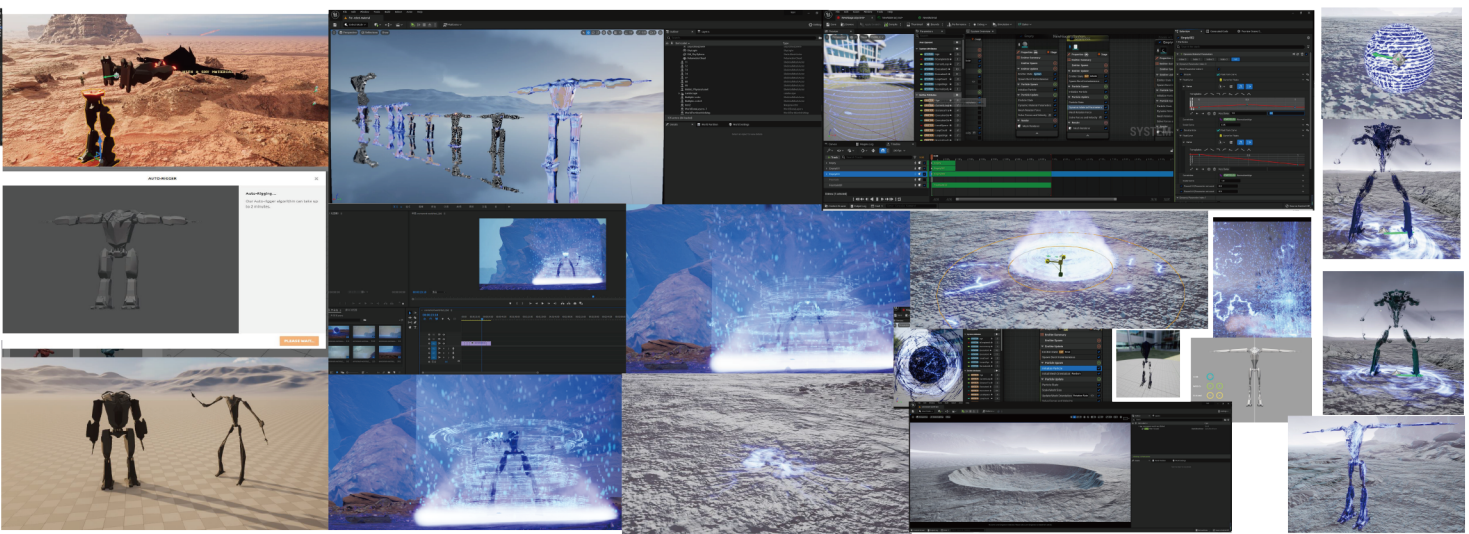
Timeline

Process
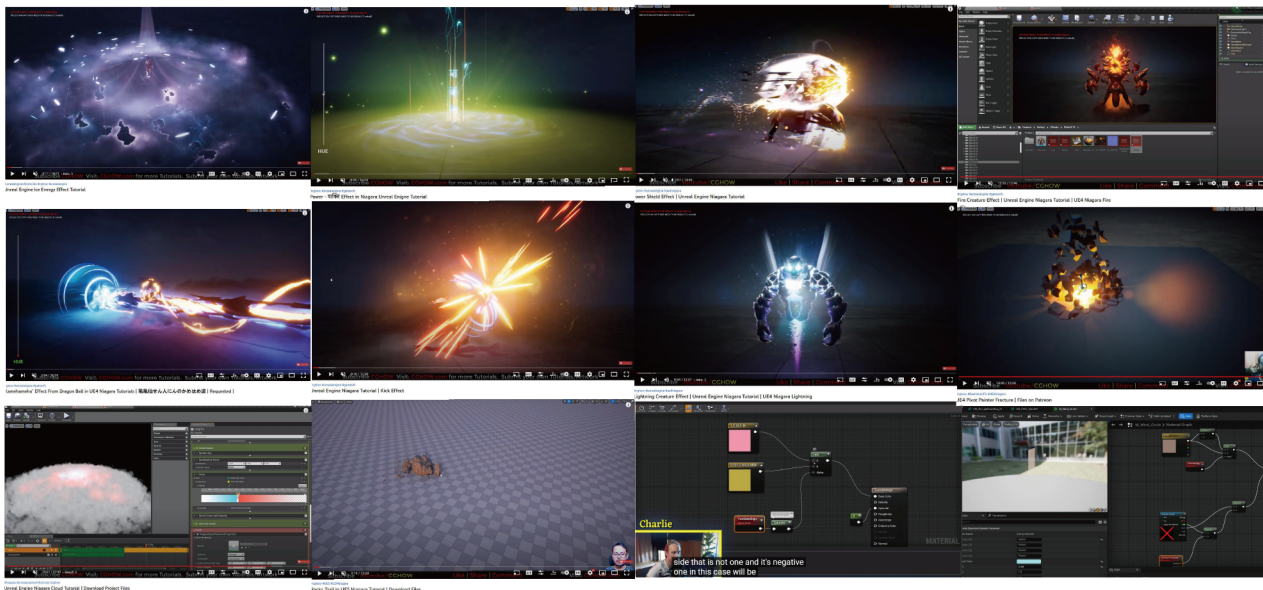
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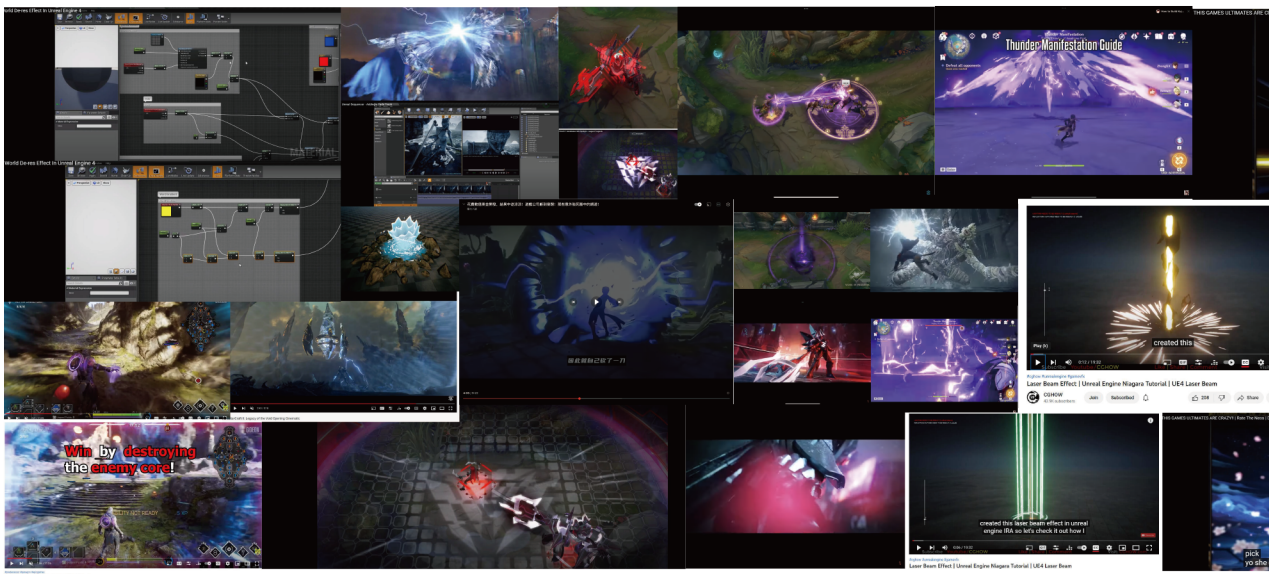
References

11/2022
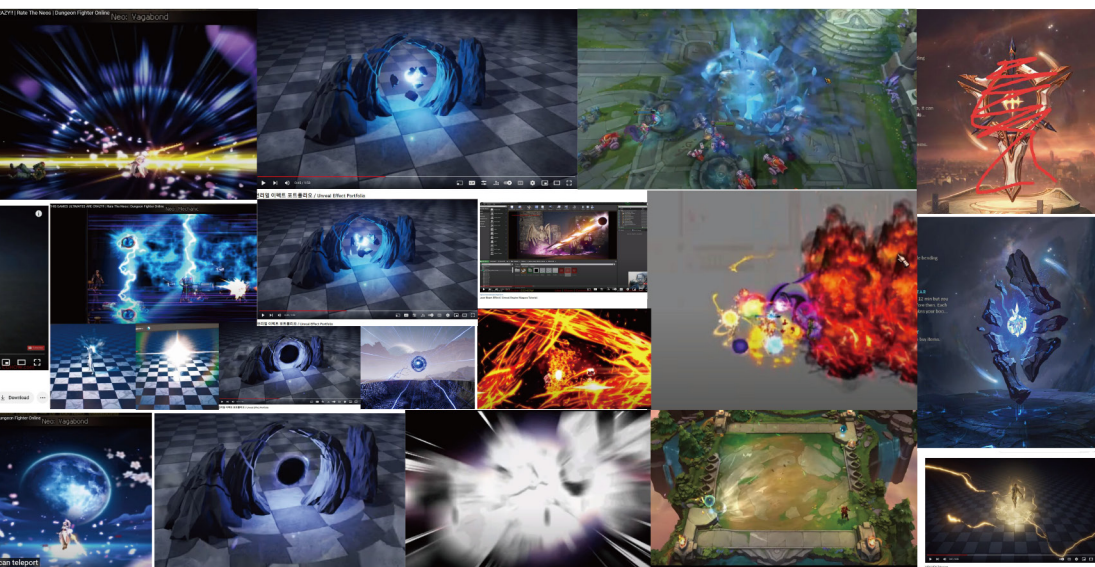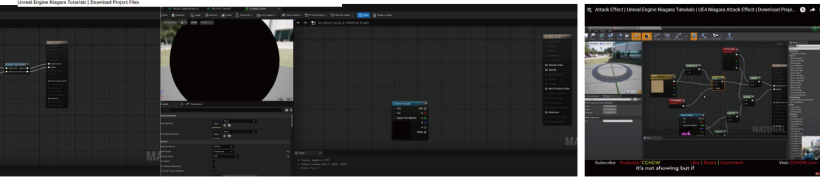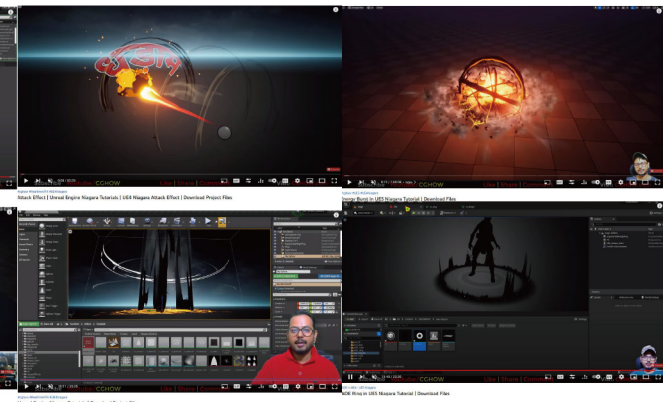
Timeline

Process
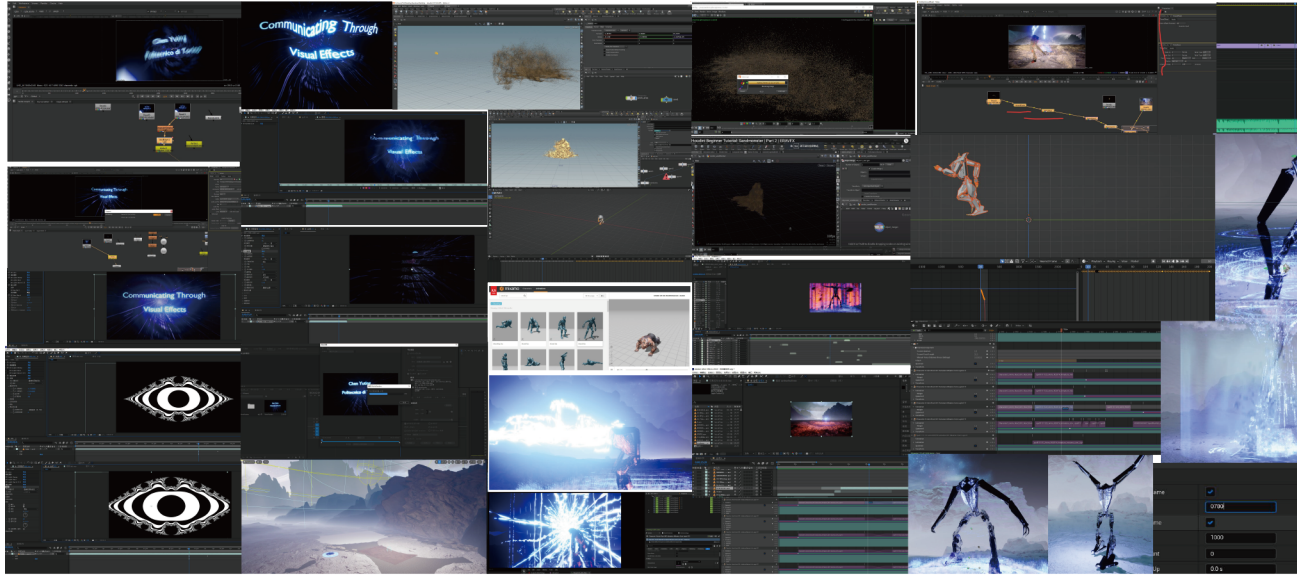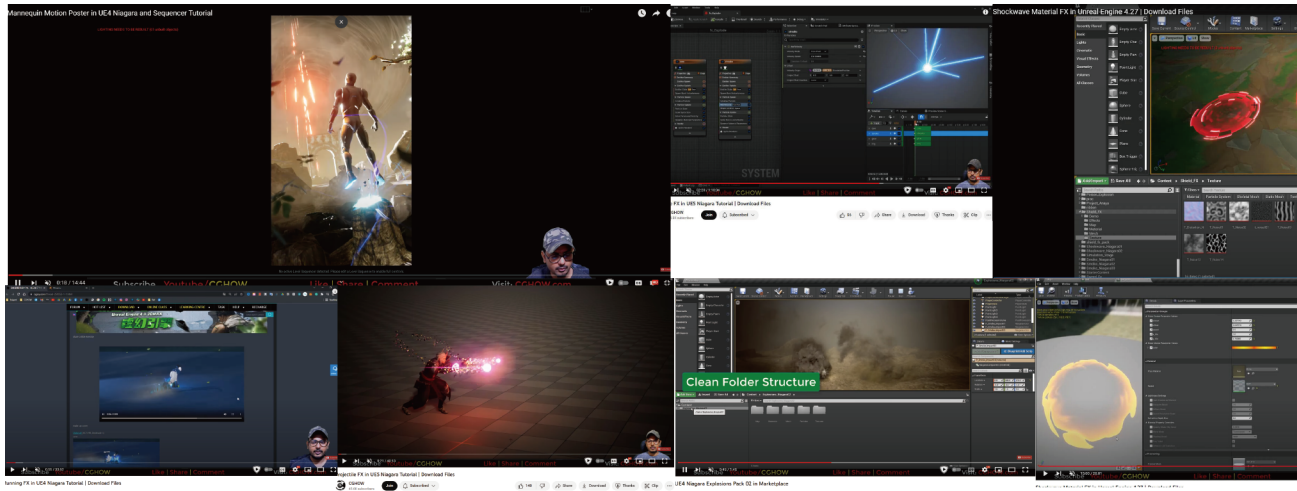
Tutorial

References

12/2022

Timeline

Process

Tutorial

References

01/2023

between 0 and 0.1
instead of 0 and 1 based on

and i want the value going out to be a
different number
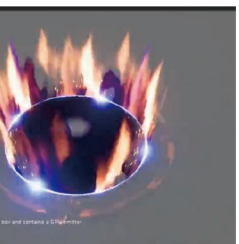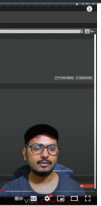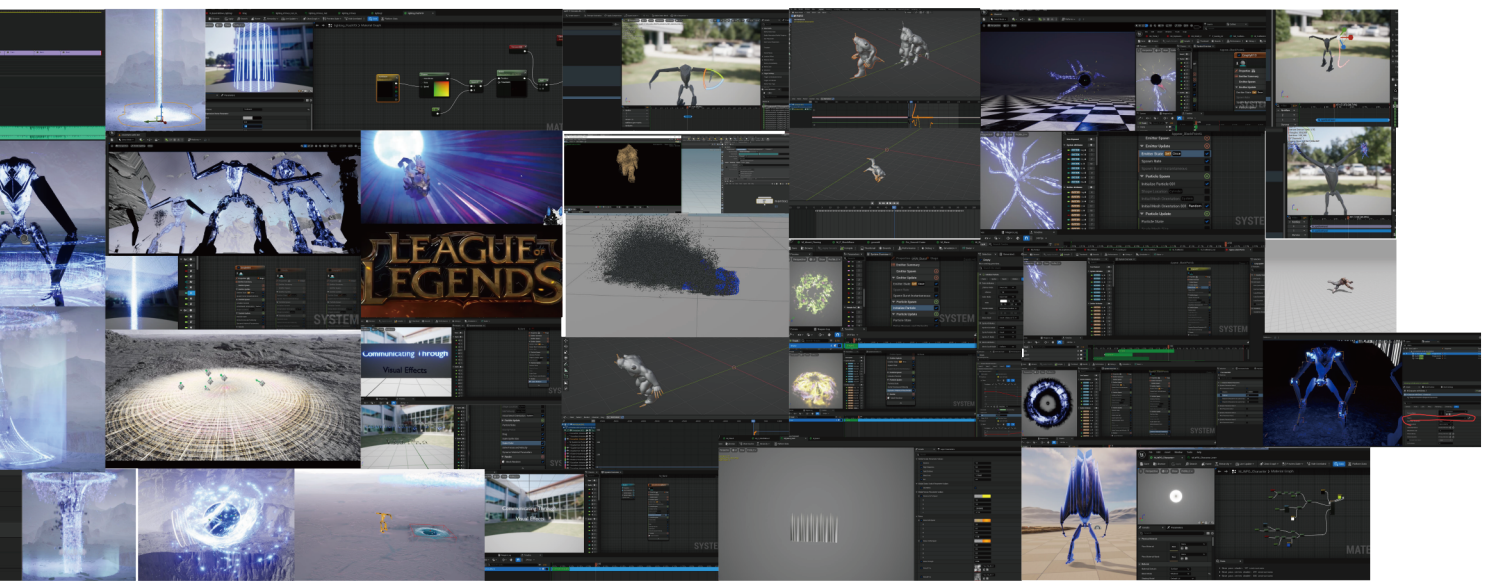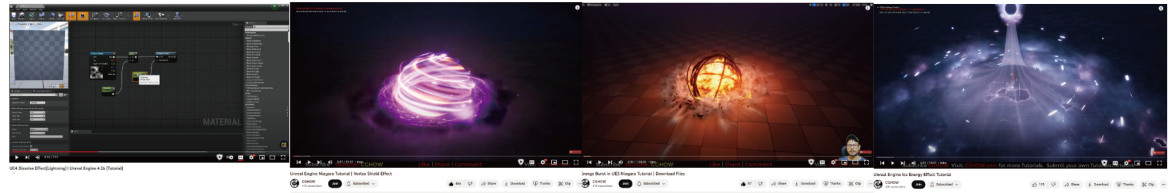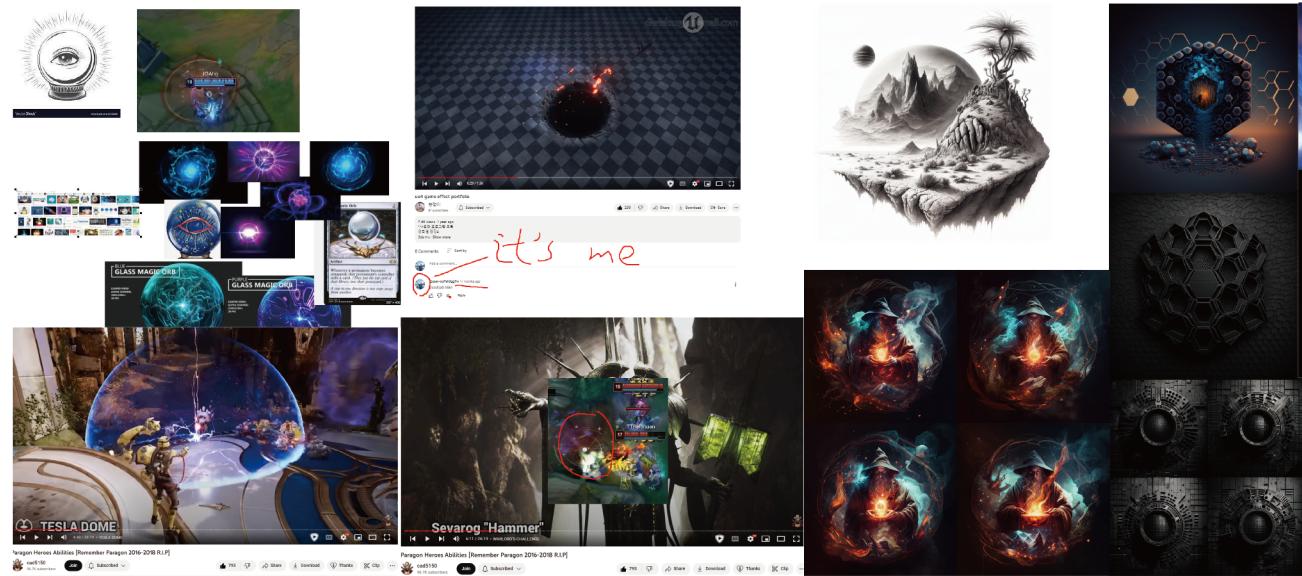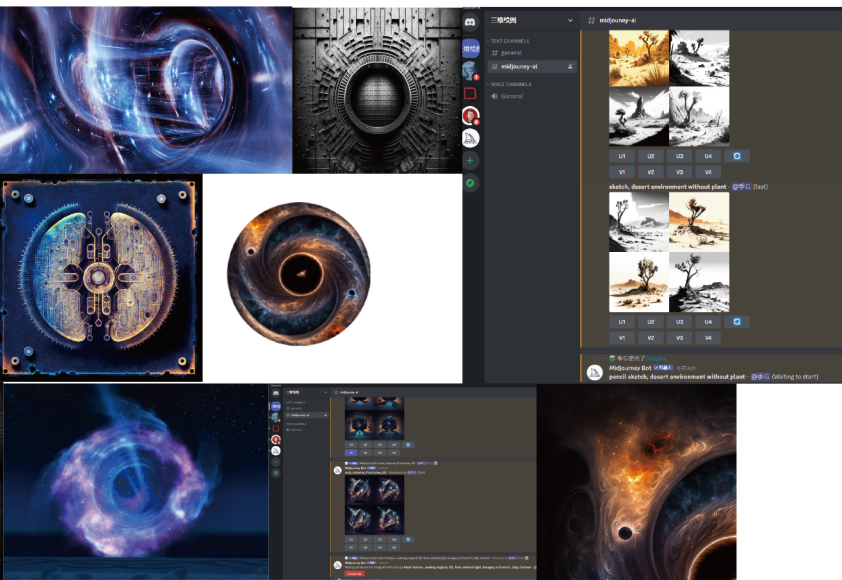
4.3 Project by Image

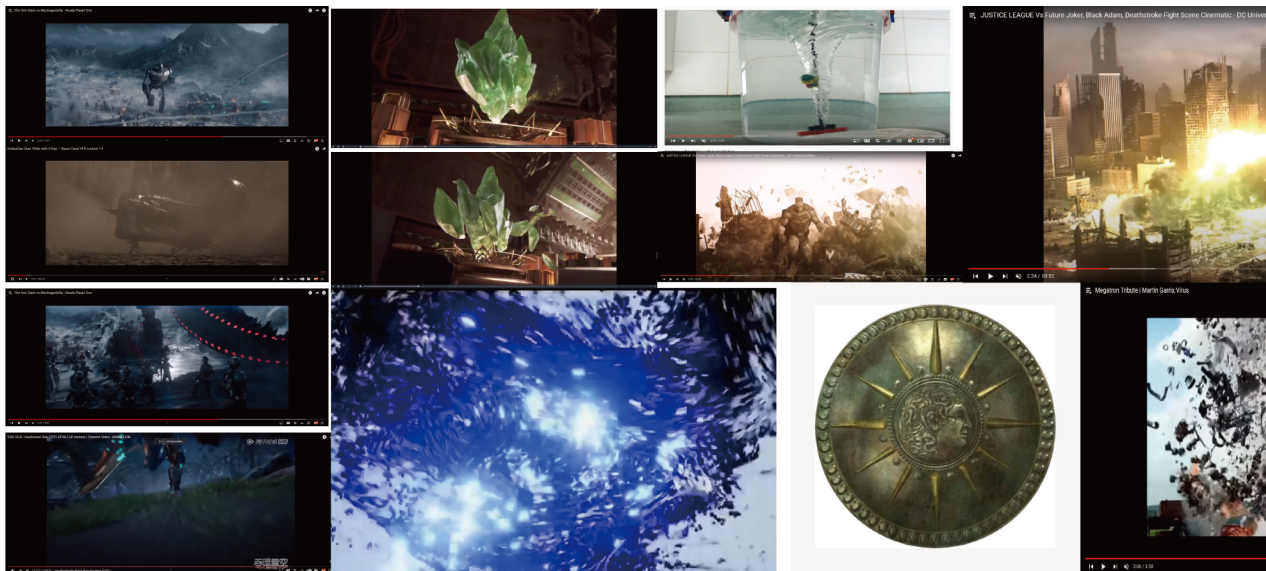**1.An unidentified object swiftly flew from the depths of the cosmos to this planet. The mountains below indicate the direction of its flight, while the background planet provides a sense of vastness and imagination for the viewers.**
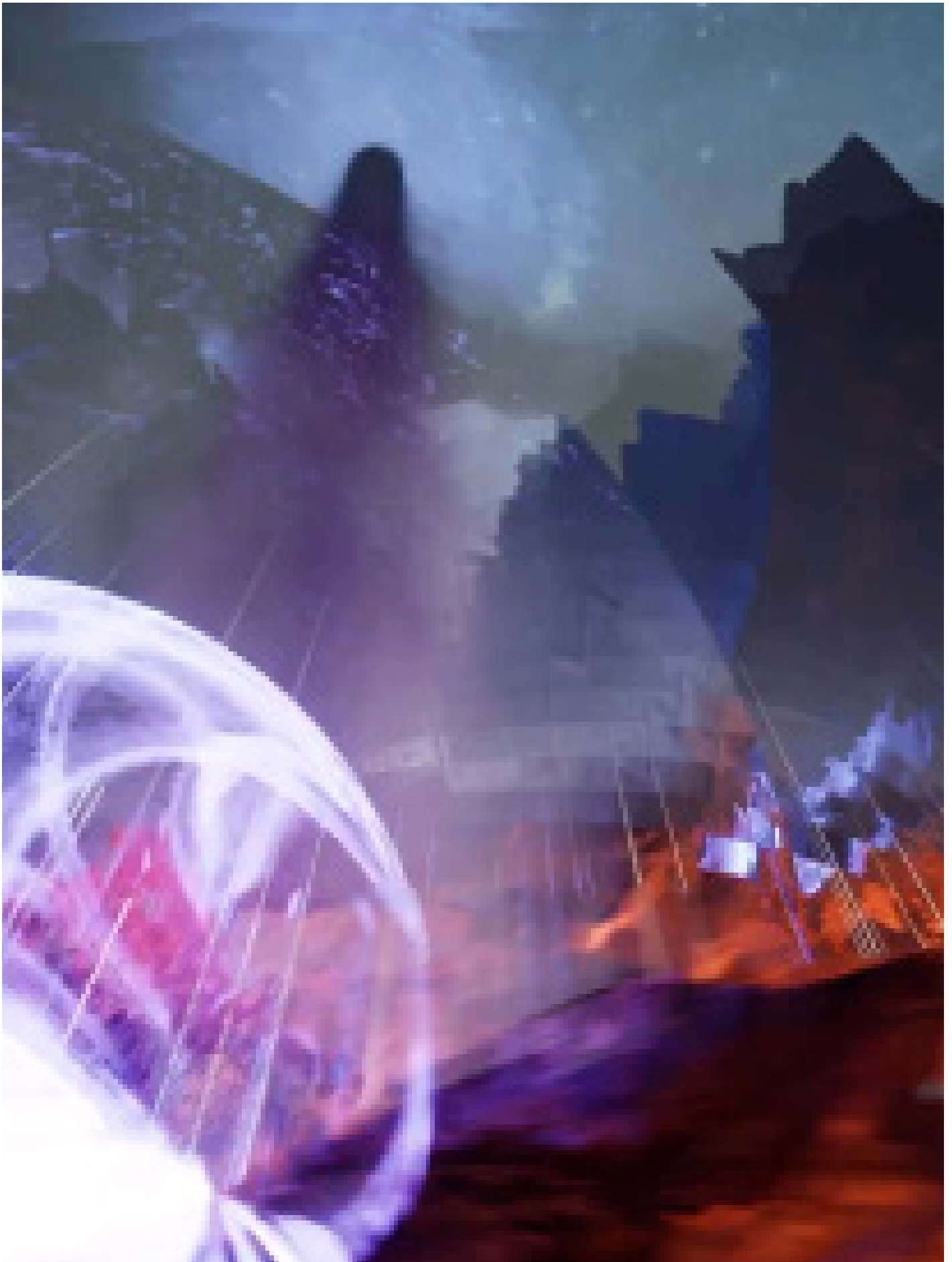
2.When an object collides with the ground, it triggers a massive explosion shockwave. The shockwave spreads outward from the point of impact, pushing away surrounding objects and the environment. This is accompanied by strong air vibrations, explosive sounds, and ground tremors, giving a sense of tremendous power. The sharp shape of the background mountains expresses a sense of conflict, effectively merging with the intense explosion into a unified whole.

3.When an object collides with the ground, it triggers a massive explosion shockwave. The shockwave spreads outward from the point of impact, pushing away surrounding objects and the environment. This is accompanied by strong air vibrations, explosive sounds, and ground tremors, giving a sense of tremendous power. The sharp shape of the background mountains expresses a sense of intensity, effectively merging with the intense explosion into a unified whole.

And when the object collides with the ground, it produces bright flashes and sparks, along with smoke and dust.

4.The unidentified object appears and collects energy. This behavior is primarily manifested through the movement of particles from the outside towards the center. Typically, the appearance of objects can be accompanied by the addition of smoke effects.

5.The process of energy conversion in the black sphere. The energy is transferred to the ground through a visual effect similar to a laser beam, and ultimately, the black sphere enters the energy array on the ground.

6.The anticipated appearance of the character, a significant amount of visual information moving upwards from below conveys the theme of emergence. The blue color and chip-like patterns provide a sense of mystery to the scene. Additionally, the visual representation of lightning showcases the immense power of this object.

7.The visual effect of the character's appearance. Flying rocks suspended in the air and blue mist give a sense of rapid motion to the scene. Additionally, the orange-red background implies the character's power. The pose of the character maximizes its sense of volume, enhancing the impact of the image.

8.8.Exploration skill.

Indicating that the character should move in this direction, with the symbol of an eye conveying the act of exploration.

9.Character running

The visual focus is on the moving legs and the smoke generated by the motion, with the camera moving downwards to capture the process of movement.

10.The visual effect of character flying takes in-spiration from the visual effect of an airplane in flight, specifically the circular airwaves generated when an airplane moves rapidly.

11.The character descends from above in an upward perspective, effectively conveying the motion of descent. As the character descends, smoke and propulsion fireballs emanate from their feet.

12.Under the effect of magical abilities, water is gathered and transformed into a red energy sphere. In this case, lightning strikes the water, leading to the visual manifestation of the magical skills.

When water is collected and transformed into a red spherical form by the magical abilities, various visual effects occur. These effects include the condensation of water streams, the emergence of magical energy, transformations of water, rotations or floating motions, and the radiant glow of magic.
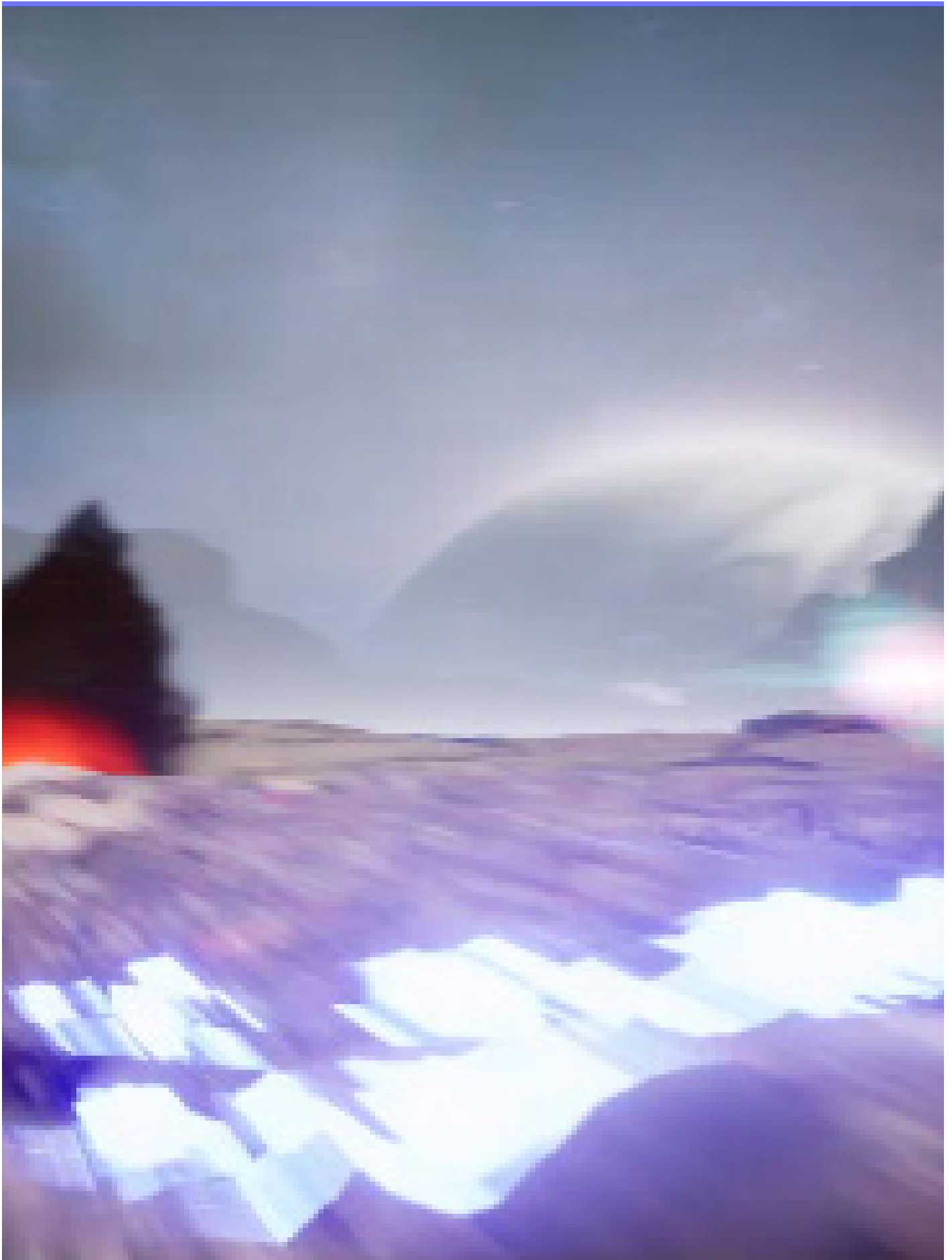
13.The fireball rushes towards the ground,erupting with smoke and debris, while an energy ball is positioned to the right along its trajectory, implying the purpose of its appearance.

14.Another character appears.

A fireball slams into the ground as the character rises from the ground amidst a smoky environ-ment.”
When the fireball impacts the ground, it generates a large amount of smoke and dust. This smoke and dust may diffuse through the air, creating a hazy area. They add a dense and obscured effect to the surrounding scenery, making it difficult to see the environment clearly through the smoke. This conveys a sense of mystery.
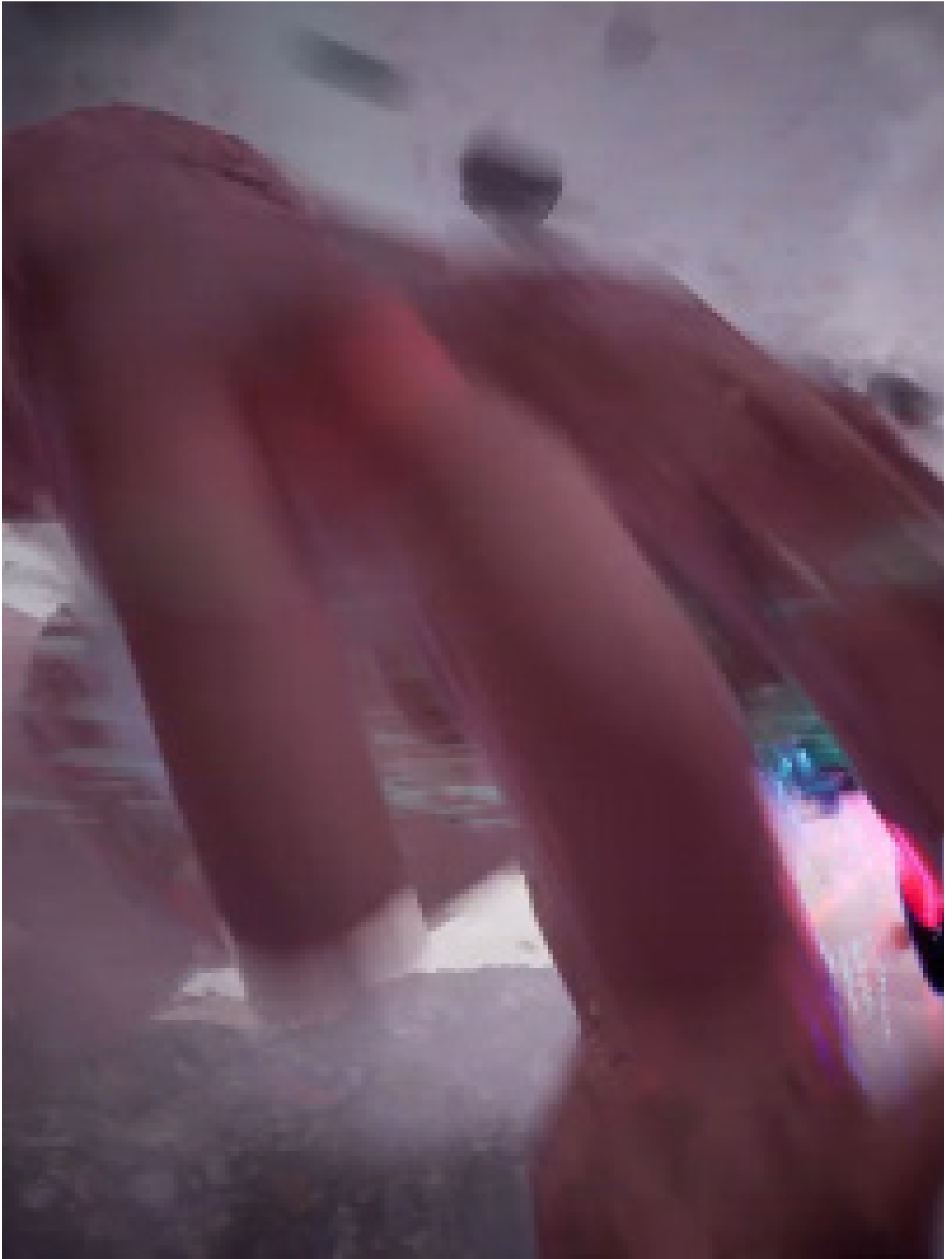
15.Another character runs and reaches out for the energy ball.

The visual focus is on the motion trajectory of the character's hand, captured with close-up shots and diagonal framing to convey instability and intense changes to the audience.
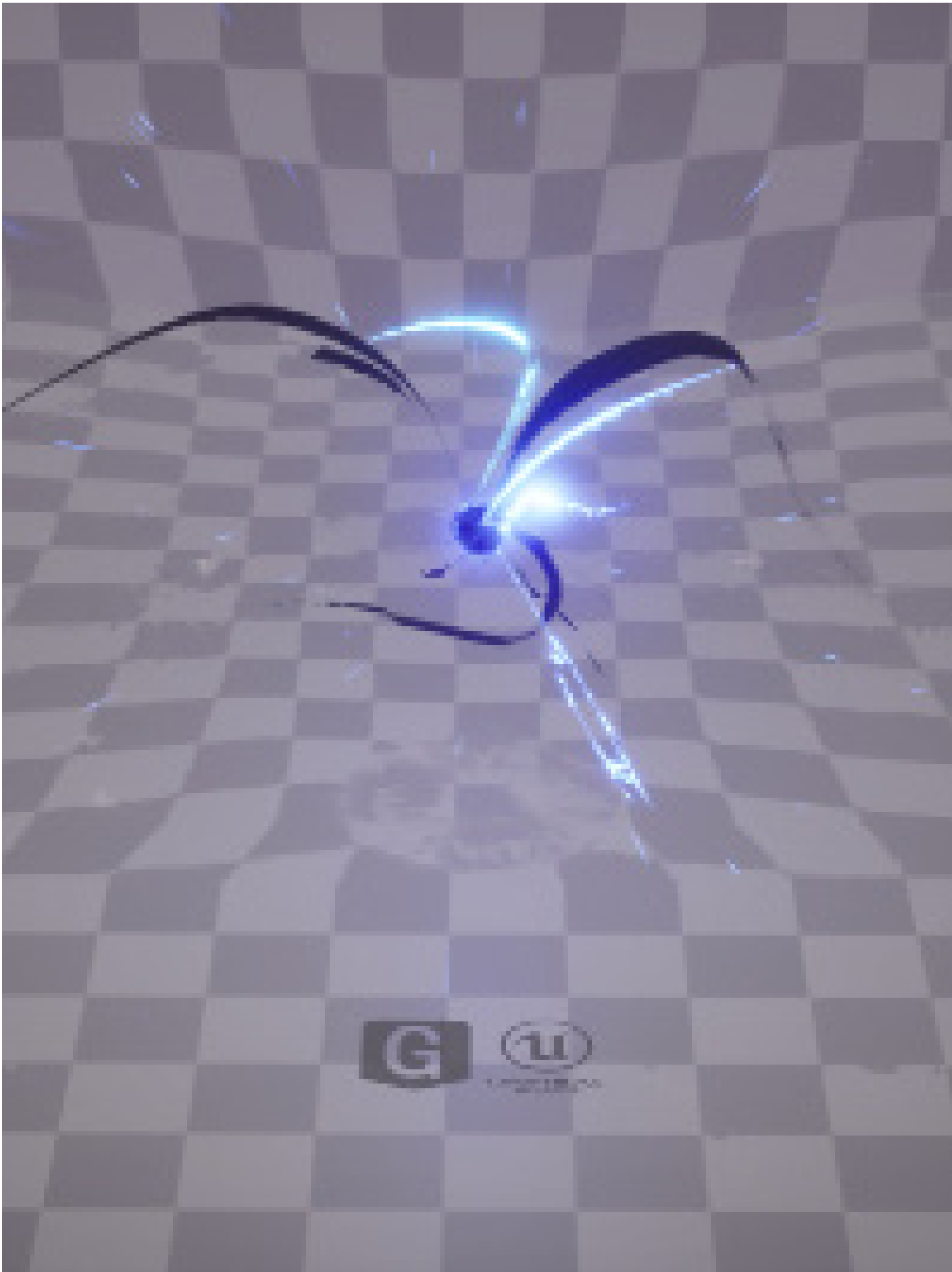
1.Charging

Elements:

Visual effect of inward absorption

Black sphere

Distortion of space

Inward absorption of wind

Visual cues of flickering lightning

My mark

Modification: The presence of lightning is illogi-

cal.

2.Charging_2

Elements:

Black sphere

Distortion of space

Inward absorption of wind

Visual cues of flickering lightning

Modification:

The presence of lightning is illogical.

Increase the visual expression of black elements.

3.Charging_3

Visual effect of inward absorption

Elements:

Sphere

Inward absorption of light

Distortion of space

Inward absorption of wind

Modification: The expression of point elements should be increased.

4.Transformation of Sphere_1

Modification: There is a lack of visual elements representing points.
The visual color for wind should be added here, reducing the black elements to a light gray color. Additionally, the shape of the surface is not logical.

5.Transformation of Sphere_2

Modification:

There should be a visual expression of energy overflowing.

Alternatively, there should be a visual representation indicating the immense energy possessed by the sphere.
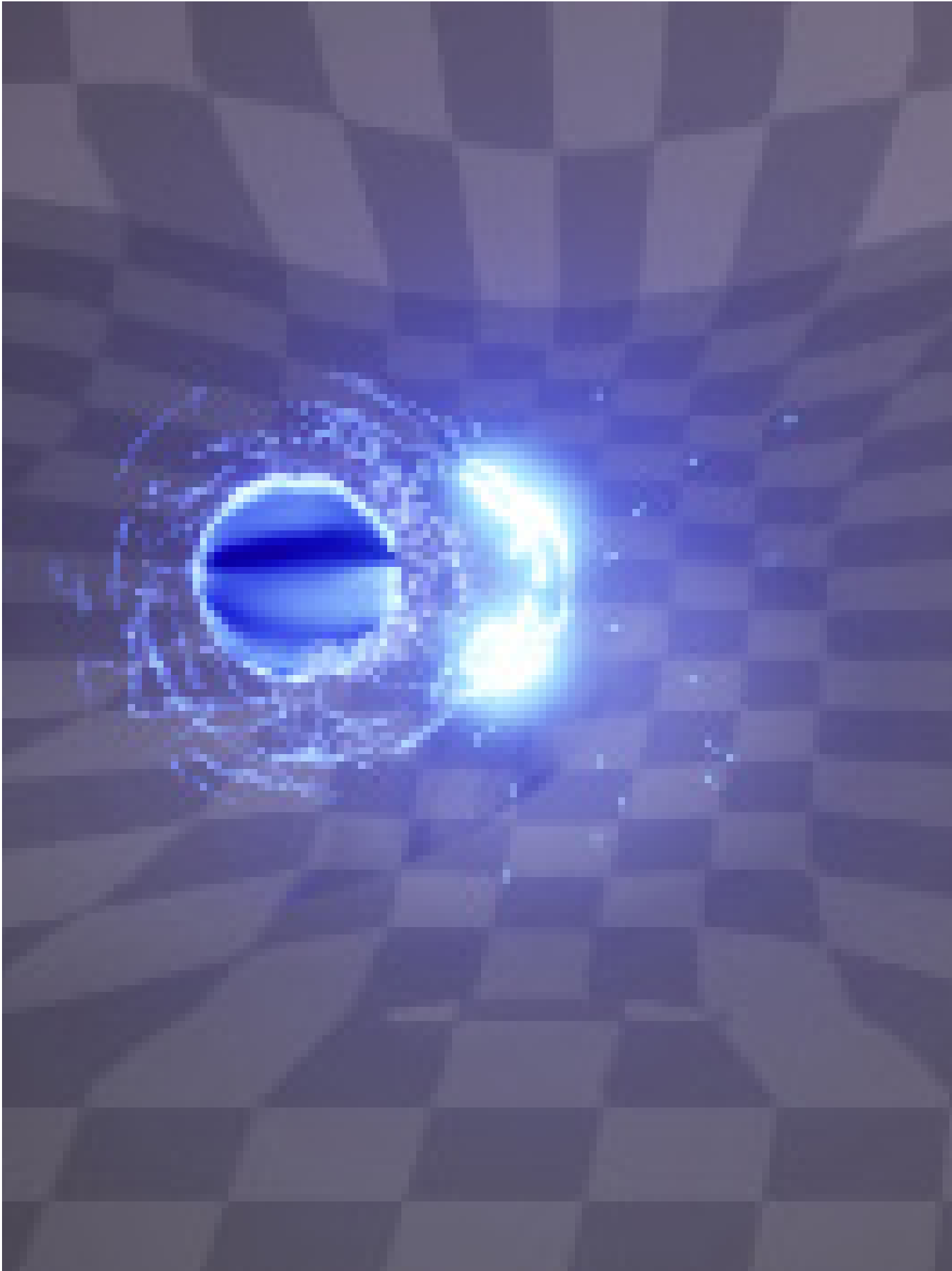
6.Anticipated Shockwave_1

The air in the surrounding space is absorbed, creating a visual effect of spatial distortion.

Modification:

The visual elements surrounding the sphere cause visual interference and should have their transparency reduced or their quantity decreased.

The expression of energy conversion is not well executed and should incorporate black elements to better convey the energy transformation.

7.Anticipated Shockwave_2

When a nuclear bomb detonates, the entire world is illuminated, and i intend to convey a strong sense of light in a reversed way.

Modification:

The shape of this flare is somewhat soft. The top and bottom of its shape should have sharp angles, similar to the left and right forms.
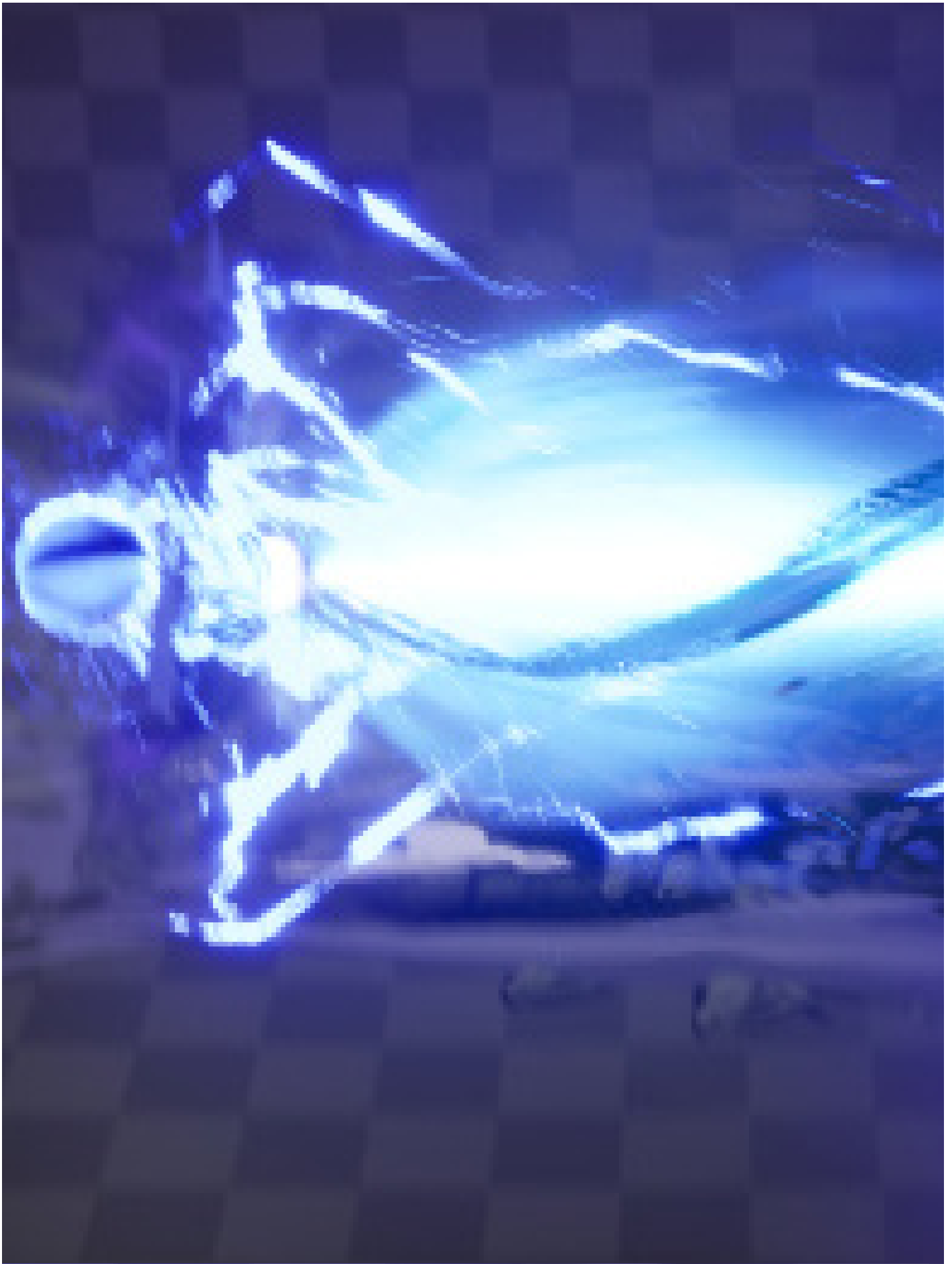
8.Release of Shockwave

Composition:

Thunder, black sphere, particles surrounding the black sphere, shockwave particles, shockwave core, black objects surrounding the shockwave, blue diffusing light of the shockwave, smoke below the black sphere, smoke below the shockwave, shockwave's impact on the ground, scorch marks.

Modifications:

The overall elements are too bright. The bright components should be reduced, such as adding black or decreasing the volume of lightning, or changing the bright lightning to black. A black object should be placed at the visual center to enhance visual clarity.

The expression and form of the black objects surrounding the shockwave are problematic. It is necessary to seek references and redesign their form and consider the underlying physics logic.

The volume of the lightning needs to be adjusted, and its logic of appearance, existence, and dissipation should be defined.

9.Dispersing Shockwave_1

Composition:

black sphere, particles surrounding the black sphere, shockwave particles, shockwave core, blue diffusing light of the shockwave, smoke below the black sphere, smoke below the shockwave, shockwave's impact on the ground - reflected light, scorch marks.

Modifications:

The connection between the black sphere and the shockwave dissipates too quickly. The lifespan of the connection should be increased.

The position of the shockwave particles should be shifted towards the left.

The position of the smoke below the shockwave should be moved to the right.

The dissolution of the blue translucent light of the shockwave should occur from right to left.

The overall color of the smoke is too dark and not transparent enough.
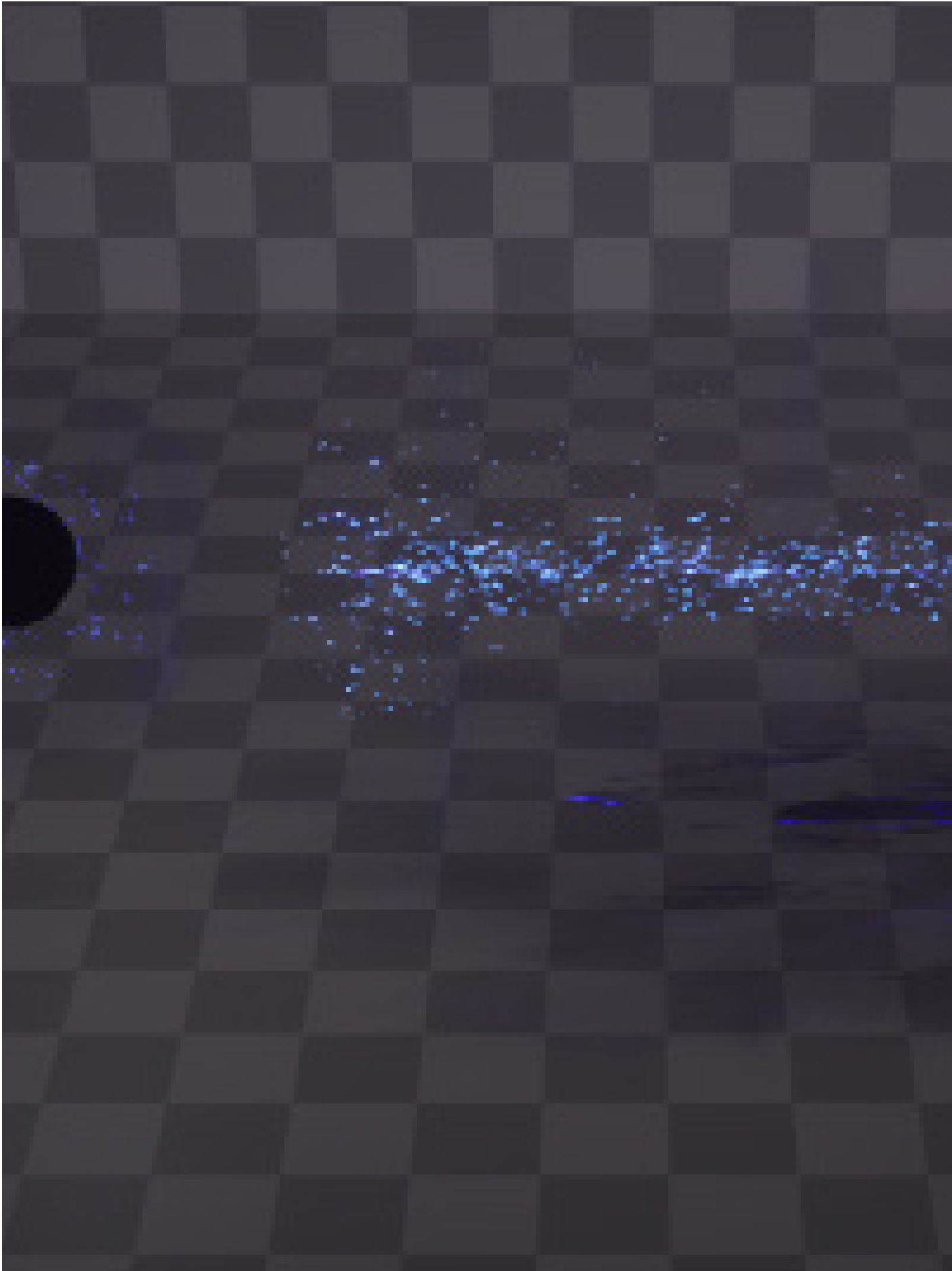
10.Dispersing Shockwave_2

This step is the final part of the special effects .

Overall, it consists of blue particles, including columnar particles and particles surrounding the black sphere.

Then, there is a visual effect of the ground being scorched by the shockwave.

Modifications:

Currently, the distribution of these particles is too scattered.

For example, the particles near the black sphere are unnecessary because the visual theme is the shockwave.

Additionally, when they disperse, there is no visual sense of wind. The burning of the ground lacks depth, such as the area near the black sphere where the scorching or impact should be more intense.

Finally, since this step is the concluding part of the special effects, the black sphere should rapidly shrink and be accompanied by a flare visual effect. This will provide a better viewing experience for the audience.

Conclusion

The two-minute animated film, created using the Unreal Engine, explores the theme of communication through visual effects. The story begins with a mysterious object falling from the sky, transforming into a black sphere. The sphere then unleashes its powers and takes on a humanoid form. The character uses its newfound abilities to embark on an exploration, eventually discovering the power of water energy. Flying to the water's edge, the character once again employs its skills to collect water and shape it into an energy sphere. In the climactic ending, the sky once again witnesses the descent of an unidentified object, resulting in the formation of another character. This new character sets out to seize the energy spheres.

This captivating two-minute animation demonstrates the remarkable potential of visual communication. Through the skilled use of the Unreal Engine, the film showcases breathtaking visual effects that enhance the storytelling experience. The transformation of the falling object into a black sphere and its subsequent evolution into a character exemplify the seamless integration of visual elements and narrative progression.

The exploration of different abilities and the discovery of water energy highlight the character's journey of growth and self-discovery. The use of visual cues and effects effectively conveys the character's emotions, motivations, and interactions with the environment. The audience is captivated by the character's determination and curiosity as they uncover the power of water energy.

The film's climax introduces a twist with the arrival of a new character, adding suspense and tension to the narrative. The conflict over the energy spheres creates a sense of competition and raises questions about the characters' motives and intentions. Through the skillful use of visual storytelling, the audience is engaged and emotionally invested in the outcome of this power struggle.

this two-minute animated film, crafted with the Unreal Engine, exemplifies the theme of communication through visual effects. The seamless integration of stunning visuals, coupled with the narrative's exploration and conflict, captivates the audience and leaves a lasting impression. It serves as a testament to the power of visual communication in conveying complex ideas and emotions, creating a truly immersive and memorable viewing experience.

the film showcases the transformative power of visual effects, as it seamlessly transitions between different scenes and perspectives,
 immersing the audience in a dynamic and visually dynamic narrative. The skillful use of lighting, shading, and camera angles further enhances the overall visual appeal and creates a truly immersive viewing experience.

In conclusion, this two-minute animated film is a testament to the incredible impact that visual communication can have on storytelling.
It beautifully demonstrates that, even without words, emotions, ideas, and stories can be effectively conveyed through the power of visuals.
This captivating creation serves as a reminder of the universal nature of human emotions and the limitless possibilities of artistic expression through animation.

Conclusion

The highest significance of visual effects should be, just like music, something that can move people. It is an art form constructed with rationality.
Regarding the concept of rational structure, it can be understood as the production process. To create good visual effects, it is important to continuously improve the production process.

Pre-production

1.Write textual descriptions (optional if the next step is done well).
2.Find references and sketch.
3.Turn the references and sketches into videos.
4.Write symbolic significance of elements, which is integral throughout the entire visual effect (a common mistake I often make is adding many elements without meaning, leading to visual confusion and wasting time).
5.Write the purpose, physical logic, composition of elements, dynamic of elements, and symbolic significance of each step in the video.
6,Harmonize the visual effects style and overall elements. Start by outlining the framework of the visual effects and then add detailed components.
7.Assess the technical feasibility of implementing the effect in a game engine.

Production:
8.Add camera.
9.Create the simplest overall effect framework.
10.Modify the overall framework, such as composition and timing.
11.Add details.
12.Make modifications.
13.Render.

Post-production:
14. Seek feedback from visual artists for modifications.
15.Make the necessary modifications.
16.Completion.

Conclusion

Conclusion about Sustainability related with thesis.

1.Virtual world construction and communication have the potential to positively impact carbon emission reduction, education provision, and social equity:

Carbon Emission Reduction:
Virtual meetings and online collaboration tools: Virtual meetings and online collaboration tools can replace a significant amount of business travel and face-to-face meetings, thus reducing the carbon emissions associated with transportation. Through the virtual world, remote meetings, team collaborations, and business interactions can take place, not only reducing carbon emissions but also saving time and costs.
Digital entertainment and media: Virtual worlds offer a wide range of digital entertainment and media content, such as video games and virtual reality experiences. These forms of digital entertainment can substitute certain carbon-intensive leisure activities, such as travel and movie theaters, reducing the demand for energy and resources.

Education Provision:
Remote learning and online education: Virtual worlds provide opportunities for remote learning and online education, breaking geographical barriers and enabling students to access high-quality education from different locations. Through virtual classrooms, online courses, and interactive learning tools, students can acquire knowledge in various subjects, promoting lifelong learning and global education accessibility.
Virtual experiments and simulations: In the virtual world, scientific experiments and simulations can be conducted in a safe and controlled manner, offering students more practical and immersive learning experiences. Virtual labs and simulation environments reduce the need for actual materials and resources while providing a more flexible and customizable educational experience.

Promotion of Social Equity:
Inclusivity and accessibility: Virtual worlds can provide more participation opportunities for people with disabilities. Through inclusive design and assistive technologies, individuals with disabilities can engage in virtual world communication, entertainment, and educational activities, fostering greater social inclusivity.
Community engagement and cultural exchange: Virtual worlds transcend geographical and cultural boundaries, facilitating community engagement and cultural exchange on a global scale. People can interact and collaborate with individuals from diverse backgrounds, promoting social equity and understanding.

2.Computer-generated visual effects (CGI) have several potential advantages over traditional visual effects production in terms of reducing carbon emissions. Here are some points of comparison between CGI and traditional visual effects production regarding carbon emission reduction:

Resource Usage and Physical Material Consumption:
Traditional Production: Traditional visual effects production often requires a significant amount of physical materials such as building models, props, and costumes. These materials need to be created, transported, and disposed of, resulting in substantial energy and resource consumption.

Conclusion

CGI: CGI primarily relies on computer software and hardware, minimizing the need for physical materials. Virtual models and environments can be created using digital modeling and rendering techniques, reducing the demand for actual materials and thereby decreasing energy and resource consumption.

Carbon Emission Reduction:
Traditional Production: Traditional visual effects production may involve extensive filming and post-production processes that require air travel, large-scale studios, and lighting equipment, resulting in substantial carbon emissions.
CGI: CGI can be achieved through virtual environments and digital compositing techniques, reducing the need for extensive filming and travel. This reduces the demand for energy-intensive activities, leading to a reduction in carbon emissions.

Time and Cost Efficiency:
Traditional Production: Traditional visual effects production can be time-consuming and costly, such as creating complex mechanical effects or building physical sets.
CGI: CGI allows for faster production cycles and cost efficiency through digital technology. Virtual models and environments can be adjusted and modified on a computer, providing greater flexibility and efficiency.

3.Story:

Transformation from Sphere to Character: Symbolizing future technological advancements, it sets the foundation for the story.

Exploration and Collection of Water: The character's mission is to investigate water sources and extract energy from them. The character possesses the ability to extract energy from water and form energy orbs. It represents a sustainable energy utilization method, emphasizing the importance of sustainable energy utilization and energy conversion.

Conflict over Resource Grabbing: The actions of another character that appears later in the story demonstrate a conflict over resource grabbing. This conflict serves as a reminder for people to seek balance and cooperation in order to achieve sustainable development goals.

Citations and References

Chi Tian Gen (2020) Houdini Unreal Engine 4 VFX, Born Digital, Inc.

Wassily Kandinsky (1926) Point and Line to Plane, Dover Publications

Ellen, Lupton. & Jennifer, Cole. Phillips (2015) The graphic design the new basics, Princeton Architectural Press

Jae, Hyung. Ryu,(2007) Reality & Effect: A Cultural History of Visual Effects, Georgia State University

AHTI-VEIKKO, PIETARINEN. (2006) Signs of Logic, University of Helsinki, Finland

Gillian,Dyer.(1982). Advertising as communication. Routledge

Li,Youzheng.(1993) Li Lun Fu Hao Xue Dao Lun, China Social Sciences Press

Thomas, A.Sebeok (1991), Semiotics in the United States, Indiana,

Mlodinov, Leonard (2014) Subliminal: The New Unconscious and What It Teaches Us. London: Penguin.

Chandler, D. (2017). Semiotics: The basics (Third edition). Routledge.

Isaac V. Kerlow. (2009) The Art of 3D Computer Animation and Effects, 4th Revised & enlarged Edition

Judee,K.Burgoon.,&Aaron,E.Bacue. (2003) Nonverbal Communication Skills, ResearchGate

Tony, Jappy. (2013) Introduction to Peircean visual semiotics. London: Bloomsbury

Tonny, Odhiambo. (2022), Semiotics, ResearchGate

VFX Tutorial Link

https://youtu.be/KApOpa1xZsM
Lightning Strike FX | Part 1 | Charge Strike

https://youtu.be/AyDY3fwnnnk
Magical Combat FX | Part 1 | Stone Creation

https://youtu.be/iYsc0UX-Gcw
Creating Stylized VFX in Unreal Engine 4 [BEGINNERS GUIDE]

https://youtu.be/0vYPkxEZEtQ
Unreal EngineSword Trail Niagara

https://youtu.be/nQaxW7TVB3I
How to make Slash Effect

https://youtu.be/upLq9KgACWY
How to make Genshin Venty wind Effect

VFX Tutorial Link

https://youtu.be/hjCU5sDwe3Q
How to Make Slash Mesh/Maya

https://youtu.be/P52CvREt13M
Unreal Engine Tutorial: Water Simulation

https://youtu.be/l0Vig-beS2c
nSwirl FX in UE5 Niagara Tutorial

https://youtu.be/PwDNnXFsLUI
nHit FX in UE5 Niagara Tutorial

https://youtu.be/Ciz-rFg52VA
nLevel Up FX in UE5 Niagara Tutorial

https://youtu.be/Bgmu9dtCte0
nCreate a fake hole in Unreal engine 5

https://youtu.be/xJMU_jE_1jE
nObject Orientation Material node

https://youtu.be/OdSG8Z9HnW0
nStylized ORB in Unreal Engine 5.2

https://youtu.be/sQFijy8KKKQ
nMagic of World Position Offset

https://youtu.be/VkWHCOCzwMI
nHow to make Soulercoaster VFX

https://youtu.be/ivlLbr1D5e8
nHow To Make A Blender VFX

https://youtu.be/mJaBRaKKF9s
nHow to Realtime - VFX / Disc Mesh

https://youtu.be/ePzaxa0JcjI
nVFX Lightning Weapon Slash Mesh

https://youtu.be/0ceI7Cm4zcw
nVFX Healing Spell Spiral Mesh

https://youtu.be/qh3TEYUN6cA
nUnity VFX Graph

https://youtu.be/MOMEf93XEkY
nMAGIC spells like FIREBALL

https://youtu.be/PEb7ujDkP44
nMagic Aura Effect - Particle System

https://youtu.be/x19wAzDeUBw
nLearn to Create VFX from Scratch

https://youtu.be/ziwNVtOyKSU
nNiagara particle sim within 6 minutes

VFX Tutorial Link

https://youtu.be/UETAS5g-q4M
nNiagara audio visualizer

https://youtu.be/AJvjCC-IhXo
nMannequin Motion Poster

https://youtu.be/V5u4iogpmQE
nSkull Aura Tutorial

https://youtu.be/GT_6jNzZl0w
nCreate this FX in UE5 Niagara

https://youtu.be/ffYVueC7Ef0
nBeam Hit Effect

https://youtu.be/urOYWgdj9S0
nAttack and Death Effect

https://youtu.be/yI_er-KCQU0
nSpawn Fx in UE4 Niagara

https://youtu.be/ezqaH7nvG8o
Skeletal Meshes, Forces

https://youtu.be/AQ61Qh5iMCU
nTornado in Niagara Tutorial

https://youtu.be/m60c_Mo2KUk
nVertex Animation Basics in Shaders

https://youtu.be/g0zk80dl0Hw
nBest Fluid and Smoke VFX

https://youtu.be/6iKBZu0cIno
nIntroduction to Niagara Fluids

https://youtu.be/nsLqHZ8t_oI
nFoot Step Dust in UE5

https://youtu.be/rFlvxvvkYRw
n5-Minute Materials [UE4]

https://youtu.be/eVpsmC3PNQQ
nUE4 Niagara Morph Effect

https://youtu.be/lX5d4YAntN8
nStylized Tornado in UE4.27

https://youtu.be/dAJo3VpLAoI
nSpacecraft Exhaust Effect

https://youtu.be/P9Bk1Ibd0YY
nCreate a stylized tornado

https://youtu.be/9ESsjkcKQjM
nShockwave in UE5 Niagara

VFX Tutorial Link

https://youtu.be/kpDAWXlEpiA
tExhaust Particle Effect with Niagara

https://youtu.be/4cnQiYbilSw
tAttack Effect

https://youtu.be/tYmrrpvn_WI
tMassive Meteor Explosions

https://youtu.be/obqkUK1oFCM
tNiagara skeletal mesh morph effect

https://youtu.be/F4p7Tf8Jv_0
tEnergy Burst in UE5 Niagara

https://youtu.be/niSWXhWNyQQ
tNebula Effect

https://youtu.be/jc7KG5dPjSQ
tGround Portal Effect

https://youtu.be/h2KqkygqPNU
tMissile Shooting Aim in UE5

https://youtu.be/eG7eqGh2sP4
tIR Flares Niagara Particle

https://youtu.be/_hnO2kbXNE8
tGround Fracture RBD Tutorial

https://youtu.be/mB0tjUd1LDM
VFX tutorial Black Hole

https://youtu.be/-7DXS7X3nn8
Outline Transition Effect

https://youtu.be/g-l9VcS7q8g
tLaser Beam Effect

https://youtu.be/35QPw-_-9JY
tBeam FX in UE5 Niagara

https://youtu.be/TQE5aXjbXXY
tUnreal Engine Niagara Tutorials

https://youtu.be/H6ZmKhzRQG8
UE4 Niagara Attack Effect

https://youtu.be/8V_VS0z0yww
Power Shield Effect

https://youtu.be/VyvOfTGh3MM
Unreal engine5

https://youtu.be/Ptuw9mxekh0
Outline Stylized Material

VFX Tutorial Link

https://youtu.be/jmXM07nHoQg
Make a "Black Hole" in UE5

https://youtu.be/NzAQ3CqWJUg
Sword Trail Effect : REFRACTION

https://youtu.be/joAUbu2_HYg
Shader Graph Basics

https://youtu.be/2l65tb73_wo
Chop and Slice everything

https://youtu.be/--R33kzXXql
Niagara Vfx Creation - Sword Pierce

https://youtu.be/KDLZBJjNtUg
Niagara Skeletal Mesh and Surface

https://youtu.be/fNk_zzaMoSs
Essence of linear algebra

Simulation Tutorial Link

https://youtu.be/V1K_XjMvgag
Building Destruction

https://youtu.be/4SWe_DZshOw
Simulation and modifiers

https://youtu.be/EM47KL-XRTw
Realistic Waterbending

https://youtu.be/exreMc7CNiU
Pre-Baked Destruction

https://youtu.be/OxCvrKph0Xs
Desert Drift Dust VFX

https://youtu.be/paNTx_uviWg
Chaos Destruction

https://youtu.be/A7QYhX76nUQ
UE5 simulation tech

https://youtu.be/cDsJoJyzOe8
Ground Breaking Effect

https://youtu.be/1Ow0HrPMnbs
Niagara system Smoke effect

https://youtu.be/e9atAxm1Cc0
REALISTIC SMOKE & FOG

https://youtu.be/xlfOOS2Y5i0
3 easy ways to create good fog

Simulation Tutorial Link

https://youtu.be/XMMfsVyzt48
FluidNinja VFX Tools

https://youtu.be/bUNqvGUVDGo
Projectile Effect

https://youtu.be/EihWP0-JOFk
Unreal Engine Meteor Effect

https://youtu.be/yNjhod2or18
Meteor in UE4 Niagara

https://youtu.be/pG88Jl2s-j4
Lightning Creature Effect

https://youtu.be/DrQbuc4EFWM
Dissolve Effect(Lightning)

https://youtu.be/9AvDP3LvEVY
Ground Breaking Effect

https://youtu.be/Oij-BdlkPgQ
DIY Overclocked Plasma Globe

https://youtu.be/_hnO2kbXNE8
Ground Fracture RBD

https://youtu.be/sd35srpVpYw
fracturing debris smoke

https://youtu.be/M6O8TMsaFAo
How to make custom velocity

Character 3D Model Tutorial Link

https://youtu.be/BwgVv7hWvko
Making Robots In Blender

https://youtu.be/2xlpYAaAPCc
Making Mechs in Blender

https://youtu.be/LdB5Gvt6Nf8
Sci-Fi Robot Drone

https://youtu.be/AT_8DU7DKUE
12 Blender Addons

https://youtu.be/65cSphe6L7k
Free Addon Carver tool

https://youtu.be/7SldytU0FX0
BOXCUTTER Tutorial for Blender

https://youtu.be/3Ty0dNNO4bE
Hard Surface Sculpting Tips

Retargeting Tutorial Link

https://youtu.be/pFouaNVxcso
Mixamo without retargeting

https://youtu.be/-JSFcSxsaTs
Rig ANYTHING with Rigify

https://youtu.be/EVBseo4YLa4
Simple Rigging In Blender

https://youtu.be/w9mijf-gKOg
How to Animate Characters

https://youtu.be/vTUmYMWphF8
Mixamo Animation Retargeting

https://youtu.be/M4WIOICK7Js
REPLACE Advanced Locomotion

https://youtu.be/04EPprP2OVg
Edit Animations Using Control Rig

https://youtu.be/NdOOoVzGbpM
Metahuman Animation

https://youtu.be/UQJcU65CvpQ
How to Retarget Animation

https://youtu.be/b43tkfUjRkE
Early Access Metahuman Animation

https://youtu.be/-_B4fiuWwmo
Make a 3D Character

https://youtu.be/5Or8yQ_QecQ
Animation Retargetting

https://youtu.be/mRYPeiV2ZvU
How to retarget animation

https://youtu.be/ff7Kio6wnSA
How to Retarget Your Animations

https://youtu.be/s-pgXn1-9to
Mixamo Animation Retargeting

https://youtu.be/w9mijf-gKOg
How to Animate Characters

Animation Tutorial Link

https://youtu.be/wYqJ7AyEuhc
Mixamo addon for Blender

https://youtu.be/3NrsSdEUSWI
Combine Mixamo Animations

Animation Tutorial Link

https://youtu.be/NIP8QibQ7XU
Combining Mixamo animations

https://youtu.be/deaQeIje-pQ
MODEL, RIG and ANIMATE a MECH

https://youtu.be/4t6MuKM1Mh0
How to work and edit animations imported

https://youtu.be/w78xUaPV0ls
How To Combine Multiple Actions and Bake

https://youtu.be/SuPOqkQ4Pwg
How to combine mixamo animations

https://youtu.be/YYFjYI8ak1o
Creating loops with NLA editor

https://youtu.be/2YAn0zAvTKs
Run, Walk and Idle Animation

https://youtu.be/ALhlZmpE-dc
Easy WINGS Rigging HACK

https://youtu.be/r-KJZSeRYsQ
HOW TO MAKE ANIMATIONS

https://youtu.be/lo76DagpS-8
Unreal Engine 4 Tutorial - Retargeting

https://youtu.be/6kC8_8crkiU
How To Create Moving Objects

Camera Tutorial Link

https://youtu.be/FdtTthV_sXI
How I get UE to look like a movie

https://youtu.be/lmxPyn1axPY
UE 5 Beginner Tutorial | Desert Canyons

https://youtu.be/MnUm1_ZiC7M
Unreal Engine 5 camera for beginner

https://youtu.be/5yLZhjStZT4
CostDown Virtual Production Vol1

https://youtu.be/7_cPGIjpMy8
How to get Cinematic Mist

https://youtu.be/5GYqpuSXR40
**Play & Render Videos in UE 5 using Se-
quencer**

https://youtu.be/hCtuW24zH_Y
Take Recorder demo

Camera Tutorial Link

https://youtu.be/FxvF3zncCIA
Improve Your Renders With MRQ

https://youtu.be/9wKHGXZFA78
Simple Exporting With the MRQ

https://youtu.be/GTc0ZCeqeQs
Houdini to UE 5 Camera Export

Texture Tutorial Link

https://youtu.be/GFs48XUk6c4
VFX/Stylized Trails Textures

https://youtu.be/dRf_kLc8ajw
Power Spell in UE5.1 Niagara

https://youtu.be/QsHExuJ520I
VFX Lightning Weapon Slash Texture

https://youtu.be/ipuumj2GMXg
VFX Small Lightning

https://youtu.be/ve-aBt22-iI
VFX / Patterns Textures TUTORIAL

https://youtu.be/WUfx5z7gi60
Lightning Texture TUTORIAL

https://youtu.be/62vCvWMzVt8
Generating Cracks in SD

Environment Totorial Link

https://youtu.be/GtEnAw-soo8
Create Realistic Terrain

https://youtu.be/Bl--1FwJo6E
Realistic Nature Scene

https://youtu.be/rOr7E0noyVw
Waterfall Effect in UE4 Niagara

https://youtu.be/3MjHEHkjtw4
Caves in UE4 using Voxel Plugin

https://youtu.be/L6H3UVrNiNQ
Installing The Voxel Plugin

https://youtu.be/XaPECMAKbSI
Destroy objects in Unreal Engine 5

https://youtu.be/5EO3gdG3S6c
Creating Mars Environments

Environment Totorial Link

https://youtu.be/1pISJAPjDS4
Niagara Fluids & Intro To FLIP Fluids

https://youtu.be/cOaCHMsUmvo
Alien Environment in UE 4

https://youtu.be/YgWUSQBuPLA
Creating a Crystal Mine

Animation Theory

https://youtu.be/28s1Hv3Zqlo
ANTICIPATION - The 12 Principles of Animation in Games

VFX Corse Link

https://www.vfxapprentice.com/courses
Learn the skills to create stylized FX for games and animation