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Creation of a Trailer using VFX and Compositing.

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SUMMARY

When creating a film trailer from start to finish, many aspects of audiovisual creation must be considered. My TFG, although each one of these workflow processes have been carried out, has been specifically focused on the postproduction part. The trailer will be for a post-apocalyptic and fantastic genre film called *Genesis* with two main characters displayed as opposites.

During the course of this project, the three main sections of the motion picture pipeline, pre-production, production and post-production will be worked on, as the main objective for me is to create my own audiovisual project with a professional level quality. However, the main issue is that most of the time these different phases require multiple artists and technicians working together and, in this work, it will be just one person. Therefore, numerous aspects of the project will have to take substantially less time than others, as time is very limited and it is very important to have a proper organization of the project and knowledge of what can and what cannot be done by the deadline.

The post-production step will be the one with the most importance, as it is the part where this project revolves around. The main techniques used in this work are the simulation of visual effects and 3D modeling in Houdini, the creation of realistic matte paintings in Photoshop and the video compositing in Nuke. This last software will be the core of the project, as it is where everything will come together as one final clip because of a good integration of the different objects in the scene.

Finally, the project has been a whole new experience for me. I have fulfilled my expectations for the project and have achieved the main objectives that I initially planned. More importantly, I have learnt to manage a big project and new techniques and procedures that will be especially useful for my professional career.

KEY WORDS

Producció, Postproducció, VFX, Nuke, Houdini, Tràiler, Composició, Vídeo.

LINK TO PROJECT

The result of the project can be found in my Vimeo page, along with the making-of.

PROJECT

<https://vimeo.com/462316505>

MAKING-OF

<https://vimeo.com/462111337>

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GLOSSARY

Alpha channel: Channel in which the transparency levels are stored. It is used to blend pixels when merging them with one another. There are multiple mathematic operations in which the pixels can be merged. These operations are known as blending modes.

Assets: In the VFX industry, assets are any features that can be used to help create a better render or a better final composite. They can be very extensive, but some used in this project can vary from images for textures, image sequences of smoke and particles or the 3D objects.

Bokeh: Blur quality of the camera when rendering out-of-focus lights. Different lenses can have various bokeh shapes and sizes.

Cleanup: Postproduction process that consists in removing all unnecessary objects from a shot in order to have a clean plate. Usual objects removed are cables, planes in the sky, errors in the filming part, etc.

Color grading: Final modification to the general color of the project to achieve a different aesthetic. Not to be confused with color correction, which attempts to correct lighting problems or substantial differences between shots. The color grading is purely aesthetic and seeks to create a different look to the film.

LightWrap: Compositing technique that spills light from the background into the edges of an object in the foreground for a better integration.

Lumetri Color: Standard color correction and color grading plugin inside of Adobe Creative Cloud's products such as Premiere Pro and After Effects. Powerful tool that allows the user to customize the color and to apply predefined LUTs.

LUT: A LookUp Table is a prearranged set of values for computational calculations. In color grading, when applied to the footage, it is used to predetermine its color look with no major modifications needed.

Matte Painting (or DMP – Digital Matte Painting): Technique based on the superposition of images that recreate landscape or surroundings in the most realistic way possible.

Mirrorless camera: Also known as EVIL cameras, they differ from the standard DSLR cameras by the lack of a reflex mirror and instead having an electronic display for the viewer. They are usually smaller and quieter than the DSLR types. Full-frame mirrorless cameras stand out for its $\approx 36 \times 24$ mm sensor.

Node (in Nuke): Nuke is built around nodes, as it has a nodal workflow. With these nodes, the composite can be created inserting and connecting to create a final pipeline. Each node does a specific task like roto, merging elements, effects or color correction.

OpenEXR: Open source image format developed by Industrial Light & Magic that supports multiple channels such as diffuse, specular, alpha and RGB. EXR is high dynamic range format as it supports up to 32bit pixels and stands out for its color precision. Due to its flexibility and multichannel abilities, it is a widely used format for VFX and compositing.

Plate: Original shot without any modifications. It is always the base with which the postproduction process begins.

Rotoscope: Technique that, with or without the help of specific software, extracts the information from one part of the video in order to separate it from the other. One main example is using rotoscope to separate the foreground from the background.

Storyboard: Set of drawings in order that represent the sequence of the audiovisual story. Apart from the main elements in the scene, it can also provide information about lighting, dialogs or camera movements.

Tracking or match moving: Extraction of the information from the movement of an object in a shot. Can be 2D or 3D. Camera tracking is the process of obtaining information about the movement of the camera so that external objects can be integrated into the moving plate.

Digital compositing: Process in which the combination and integration of different elements is carried out into just one final clip. These different elements can be part of other clips, 3D objects, matte paintings, effects... It is usually the final part of the postproduction phase before the color grading.

1. INTRODUCTION

1.1 MOTIVATIONS

The motivation for this project comes from the curiosity I have always had about how the effects in movies are created. In fact, if visual effects are well integrated, the viewer will never know if what he is seeing is real or not, which is even more fascinating when he or she can see a making-of video and see that nothing he has seen in the film was real; buildings, people, the sky... infinite possibilities of creation to try to deceive the viewer. This curiosity, once I have learned more and more software and techniques, has made me realize that it is a giant world and a work that combines creativity, technology and teamwork.

When I learned exactly how the visual effects pipeline was, I noticed that the compositor was almost at the end of the process. This artist is in charge of integrating everything that all the teams have done previously and creating the shot that will come out in the final work. This attracted me a lot as seeing how everything that has been created during weeks by multiple artists and technicians passes through your hands and being able to be the first one that can see the result of many hours of work has to immensely gratifying.

In relation to the project, why a trailer? I think that a trailer is the audiovisual work that combines all the world of visual effects and at the same time, it is more adapted to an End of Degree Project in dimensions of time, budget and duration. In addition, although the project is focused on the post-production phase, I wanted to create a work that is one hundred percent mine and did not want to take already recorded shots and only do the part of effects and integration. This way, I can express my creativity from the start of the project and this way learn in more areas of the audiovisual creation.

In addition, creatively, I think a trailer is like the face of the film. It is its main presentation, so you need to convey a series of values and emotions through the images, effects, music and titles, among others. A well-done job would make the viewer, once he or she has seen the trailer, want to see the film.

1.2 FORMULATION OF THE PROBLEM

This project is about the creation of a trailer for a fictional film of a fantastic and postapocalyptic genre, supported, above all, by the visual effects that will be applied.

Film is an industry that reaches a large number of professional profiles and each production can move millions of euros invested in large amounts of staff, equipment, logistics and more. In this project, all these profiles of direction, production, director of photography, camera operator, etc. will have to be compressed into just one person. This also involves that this large amount of money translates into the minimum possible.

Once we enter the post-production and visual effects sector, the problem we encounter is even bigger. When we talk about the term *post-production*, we usually mean all the work that is done after the shoot, but the enormous amount of different work profiles means that specialists are needed of every specific aspect such as lighting, texture or fur artists. This means that there are many different teams in the workflow that have to work inheriting and continuing the work done by another. All these different profiles, in this project, will also have to be reduced to just one person.

Given these two major general problems and the importance of teamwork between different sectors of work, it seems impossible that only one person with a minimum budget can carry out a project as similar as possible to a professional production.

Therefore, once the problem has been detected, solutions must be found to minimize the impact of these issues on the result.

The main measure taken has been to focus the post-production work on compositing and the integration of matte paintings and effects. The other areas of the workflow, such as 3D or particles with Houdini, have been reduced in importance inside this project.

Another measure that has been thought of is saving resources during filming. Two close friends to me have been chosen as actors and the locations to which we went to shoot are local locations that we will later be able to place in a fantastic location with the help of the DMPs. This saving of resources also means not having the best equipment for the shooting, since the lack of a gimbal stabilizer, for example, causes that later on extra work will have to be done stabilizing the shots before starting with the effects.

In pre-production, where time and work have been reduced is in the process of making the script. Although it is supposed to be a whole film, the project is based only on the creation of the trailer, and as these do not tell the whole story of the film, time can be saved by not making the complete script and making a reduced one that expresses the general ideas of what the film will be.

In general, it is essential, apart from a good management of time, a previous study and to have clear ideas of what you want to prioritize in the project and what you can dedicate more or less time to.

1.3 GENERAL OBJECTIVES

The general objectives revolve around the main motivation of this project.

Firstly, the main objective is to have a professional quality trailer based on the use of visual effects, matte paintings and compositing to create the post-apocalyptic and fantastic genre shots that would not be obtained without the use of these techniques.

Knowing in depth the importance of each stage of the work, from pre-production to post-production, is also an essential objective. The theory always takes into account factors that the different stages need to fulfill for the project to progress, but it is not until you experience it first-hand that you can really see how essential it is to do a good job in all sections of the workflow.

In addition, I want to learn new tools, resources and software that are used in the professional field in order to have a higher quality work. These new programs and ways of working are not only applied in the post-production section, but also in the preproduction and management section and capturing and recording the images.

Finally, as a personal objective, with this project I want to do a good job in order to have a professional quality work that will be useful for me in the future.

1.4 SPECIFIC OBJECTIVES

As for the specific objectives, they will be separated into the three main stages of the workflow, with emphasis on post-production.

In the pre-production stage, I want to make a good conceptualization of the idea of the trailer and a small fictional script that will help the viewer place himself in the film. In addition, I want to have clear the locations of the shooting and know how and when to shoot to get the shots I need with a previous storyboard.

In production and shooting, I want to learn how to record and manipulate a high-end camera to get good results. These shots will have to be recorded always thinking about the modifications that will be made in post-production and having the maximum possible fidelity to what has been previously planned.

For the post-production, I want to learn Nuke to be able to use a more advanced and used software within the professional industry. In addition, it is also important to know how to apply visual effects generated in Houdini to previously recorded shots so that they have a good integration. Another important goal I have set myself is to make a good creation and integration of matte paintings to place the character and the scene in a location with a vastly different aesthetic. Finally, the treatment of color requires good work to give character and identity to the trailer.

1.5 PROJECT SCOPE

The scope of the project ranges from the creation of a fictional story to the postproduction of all the shots, including recording with actors in different locations.

First, I need to think about the general idea of the story I want to tell. Once the idea is clear, I will have to make a document with possible ideas and the concept art that will be used in the project, since I need to know exactly how I want to represent this story, what aesthetics it will have, what colors will be used, how the actors will be dressed...

Once we have the idea and the concept that we want to transmit, we will think about how we want to capture it to show it on screen with a quick script and a storyboard that will help us to have a clear idea of the shots when recording. We also have to be clear about which camera to use, the lens, the actors... After recording, we will have to make the 3D that we want to implement within the shots and matte paintings of the shots that need it. Finally, all this will have to be integrated into the plates.

This work is mainly aimed at fans of apocalyptic and fantastic cinema who, with a well-done job, will be left wanting to go to the cinema to see the hypothetical film behind the trailer.

The project can also be used as an informative tool by everyone who needs to know more about how to carry out a large project with a small budget and only one person. In addition, it will also be useful for anyone who wants to know more about how some visual effects techniques are used or how the workflow works.

The main beneficiary of the work is me. This project will be later used to take part of a personal reel to show my skills in the sector and be able to have a good career prospect later into the industry, which is my personal goal since the day I knew about the world of visual effects.

2. STATE OF THE ART

The state of the art of this project can be classified into two main sections, the creative and the technical. In the first one, I will analyze references of trailers of the same genre and their evolution throughout cinema history and how is the state of the art nowadays in the postproduction field in the trailers of the post-apocalyptic genre or similar. In the second, however, the tools and resources used to make the trailers over time will be discussed. More technical issues such as the aspect resolution they use, or the image quality will also be discussed.

Starting with the creative part, one of the main references to the culture of postapocalyptic cinema is *Mad Max 2: The Road Warrior (1981)*. The trailer for this film, along with others from the same period, is based on the use of very few visual effects and many special effects recorded at the location itself. At that time, this type of trailers did not propose the idea of selling the film in a creative way and focusing it on showing the emotions and thoughts it will raise in you as it is done today, but it was based more on a very brief summary of the film. This can be seen in the speed with which the shots are shown and, above all, with the amount of dialogue you hear, since the clips are truly little modified from the original film.



Fig. 1 Frame from *Mad Max 2: The Road Warrior (1981)*

Today, there are substantial differences in the creative aspect because of how it has evolved since the beginnings of the genre. To begin with, the current trailers do not aim to summarize the film, but rather to create a story with emotions that leave the viewer in complete suspense at the tensest moments. This makes the viewer be more motivated to know how the film will develop and how it will end.



Fig. 2 Frame from *The Revenant (2015)*

To make this change in perspective from the older ones that have been spoken about previously, several resources are used, the most important of which is the way in which the information is displayed. The type of editing of the new trailers involves creating many cuts and fade-outs to black to create more tension with the idea that the viewer does not see everything that is happening in the scene. In addition, the pace of the action slows down considerably, as longer shots are used which can create more of a sense of mystery and intrigue. This is directly related to the fact that we no longer try to summarize the film, but rather highlight the most interesting shots of it.



Fig. 3 Frame from I am Legend (2007)

Audio is another tool that makes a big difference between a current trailer and an older one in this genre. The dialogues between the characters lose a lot of importance and become voice-overs that explain in an abstract way what is happening in the story or what the protagonist thinks. This is a way of adding more intrigue to the story, since we do not see or know who this supposed character is that is speaking off-camera. That is why in this project I will not make use of dialogues between characters and I will use voice-over to complement other aspects and create more mystery in the scenes.

Complementing the audio section, music has also changed. In the newest trailers, instrumental music is used much more intensely for the tense moments and with the aim of always complementing the video editing to always adapt to what is happening in the trailer. Music and video synchronization are very important in order to emphasize the emotions of the viewer.

When comparing the trailers more technically, the first clear difference we can see is the image quality. Technology advances very quickly and this is the factor that has been most exploited. Besides, the aspect ratio has also changed, partly due to the new cameras and the most used format nowadays is the panoramic one. It is possible to find films in any aspect ratio, but a quite common one is 21:9, which is what we know as ultrawide panoramic resolution. This is due to the anamorphic lenses in cameras used in cinema.



Fig. 4 Anamorphic lens

In the technical section of the state of the art, the use of the tools used to make the trailers and, consequently, the films, stands out above all. Professional software is a relatively complicated world. Apart from the very high prices, the big production companies can even create their own software to make their project in the way they are most interested in and, if this tool works very well, then they can put it on the market. This means that there is a great variety of software for the professional industry and many programs are specialized in certain aspects. An example of this is the .EXR format, which was created by Industrial Light & Magic and, once released, has become the standard format for video processing.

The evolution of professional software has not been characterized by major changes. The programs that have been or are standard in the sector are usually relatively old programs that have been improved with new versions and updated with the newest technologies. Some examples of this type of software are Nuke (1993), Fusion (1996), Houdini (1996), Maya (1998) ...

In this project, I will be using Nuke for the main part, the video compositing. This tool has evolved over the years and is now an industry standard. In this case, this software was also developed by a visual effects company, Digital Domain, in 1993, although it was bought in 2007 by The Foundry.



It is a nodal work tool, so the workflow is completely different from the linear one that programs like Adobe After Effects have, for example. Most industry standard programs use the nodal workflow, as it is much more useful and intuitive once you get used to it, as it offers much more flexibility in the way it handles all of the effects and objects added in the project among many other things.

Other options that can compete with Nuke are Fusion, from Blackmagic or SilhouetteFX, which started as a rotoscoping tool but has evolved until now, which is also a video composition tool.



In the 3D and effects part of the project, I will use Houdini.

This program is a software with a lot of potential, since it is very powerful in many aspects and is growing very fast in the visual effects industry.

Although it also has some video composition tools, they will not be used in this project, as Nuke is more suitable. The part that will be used is its 3D and particles. The 3D part is not the most powerful in the market either, since programs like Maya or Blender are more suitable in this aspect, but as in this project there won't be so much time dedicated to the creation and animation of 3D, with Houdini's part is more than enough. The part where Houdini stands out by far is in the effects and simulations, so I will take advantage of these capabilities in this work, either by simulating particles or other animations.

2.1 MARKET RESEARCH

For the market research, I will briefly analyze some examples of trailers that have some similarities to this project.

Trailer of *I Am Legend* (2007): A reference film in the post-apocalyptic genre. The trailer is based on a character who uses a voice-over to tell, with great emotional strength, his feelings and what it is like to be alone in a world where only he seems to be left. We can see shots with a lot of meaning and you clearly see the passage of time of the protagonist's stay in what looks to be a lonely world. It makes repeated use of black fade-outs with marked hits of sound effects to create tension in the viewer and takes advantage of this to introduce the different titles of the film. The action speed of the shots gets slower when the trailer is trying to introduce intrigue or fear into the spectator and gets much quicker when fast movements are happening.

Trailer of *The Book of Eli* (2010): Great inspiration for me in this project and an important film in the post-apocalyptic genre. It also makes use of the voice-over of the main character's thoughts, although it combines it with several short dialogues. In this case, the trailer combines long and short shots but all in wide desert surroundings. The use of music is interesting because it does not use motivating instrumental music but still uses the fade-outs characteristic of this genre. Another remarkable aspect is the use of typography and its design in the titles, since it gives a lot of character and personality to the trailer and to the film.

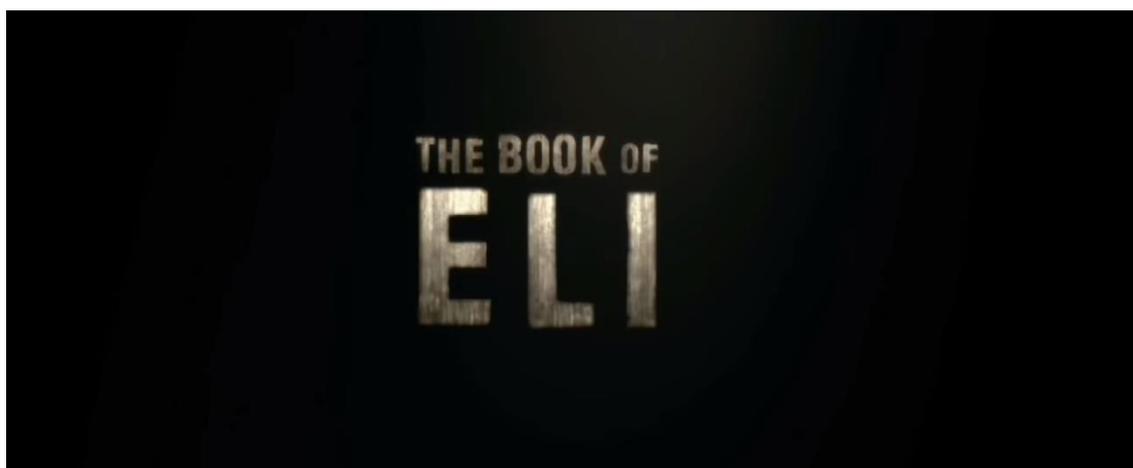


Fig. 5 Lettering from *The Book of Eli* (2010)

Trailer of *Oblivion* (2013): In this case, a film set in a post-apocalypse of the future. It is much more futuristic with the ships, weapons, clothing... However, the use of open surroundings and matte paintings caught my attention, especially the first shot of the collapsed baseball stadium. Uses characteristic instrumental music and makes use of superimposed dialogue over many shots, which makes the impression of voice-over.



Fig. 6 First frame from the trailer of Oblivion (2013)

Trailer of *Chernobyl* (2019): Example of a trailer that is not for a movie, but for a series. This trailer uses many shots in slow motion and long duration, which I think is very indicated with the story it is showing us. The most remarkable attribute of this work is the use of color that is made both in the trailer and during the series. It is a very greenish color grading with low saturation that perfectly represents the toxicity of the environment and the characters.



Fig. 7 Frame from Chernobyl (2019)

3. PROJECT MANAGEMENT

3.1 PROCEDURE AND TOOLS FOR MONITORING THE PROJECT

SHOTGUN



For the general organization of this project, the software Shotgun will be used.

Shotgun is a project management program specialized in large productions and in the control of the deadlines and shots that each artist is in charge of in a project. This software is used by the most important VFX production companies and, therefore, it will be especially useful in this work.

Apart from the GANTT that will be discussed in the next section, Shotgun offers other interesting features that will be used. One of them is the organizational section of shots and sequences. What is usually done is the creation of a task for each plate that I will have to work on and all these organized by sequences. To each plate, you can assign the different steps that are used in the VFX pipeline such as tracking, roto-scoping, effects, lighting treatment, etc. This way we can have better control over the time that each clip will take and the producer of the project, in this case the TFG director, will be able to see day by day how the work is progressing and the different versions that the artist is uploading.

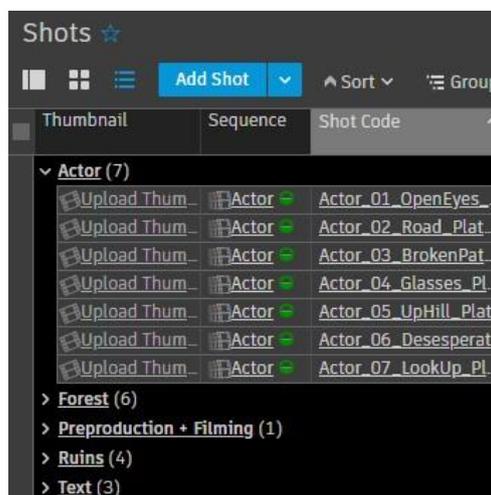


Fig. 8 Shots added in a Shotgun project

The versions section is also very useful, since the various versions of a shot can be progressively uploaded in order to receive continuous feedback through the comments that can be added. This tool will be the main communication channel with the TFG director when making the necessary corrections and improvements to the different versions.

The Shotgun tool has been chosen over Trello or similar tools for its versatility and ability to upload the progress of the project. As for me personally, as it is one of the most used production software in the industry, I want to get familiar with it as much as possible. Besides, I can also do without the Google Drive tool that is so widely used, since the same shots and assets would already be shared into Shotgun.

GANTT

The tool that Shotgun offers us to make the GANTT graph is very useful. Once we have all the shots and their tasks integrated into the program, we can add the start and end dates of each clip and it will automatically create the scheme.

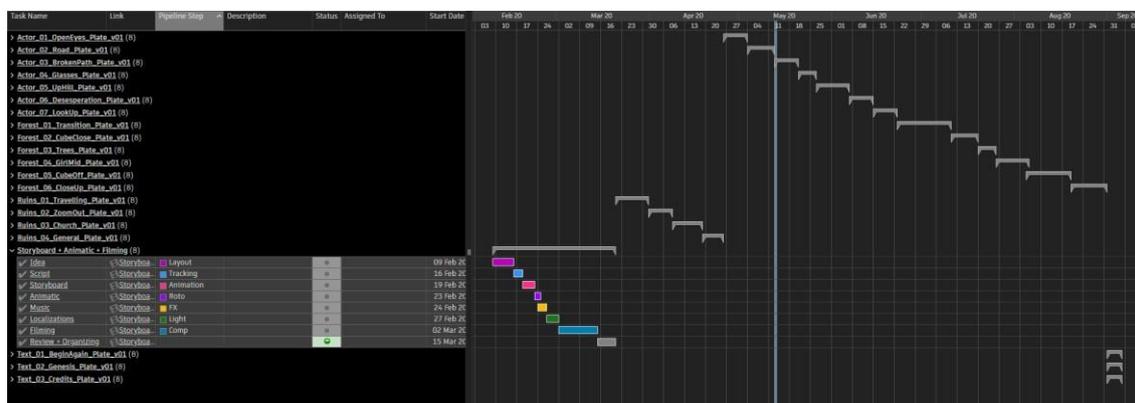


Fig. 9 GANTT graph inside of Shotgun

In addition, inside each plate there are the different tasks that must be done, so we can get a lot of precision in the GANTT if we wish.

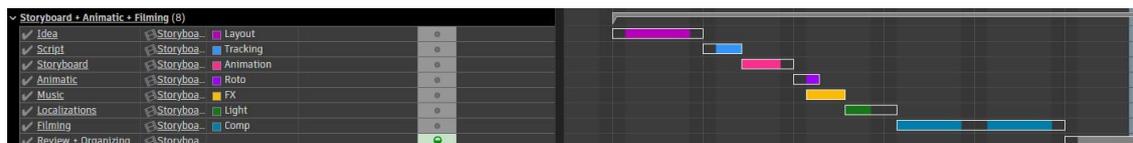


Fig. 10 Detailed GANTT graph

The time that will be spent on each clip has been calculated by looking at the amount of work required for each plate and whether resources external to Nuke need to be created, such as effects, 3D or matte paintings.

At first, the different timings in the project were projected to end at around June, when the first deadline was. However, for reasons beyond the control of the project, I had to postpone the deadline until after the summer. This would mean a big change of plans in the initial planning of the TFG, as I was not able to proceed with some parts in the previously stipulated dates and had to reschedule all the shots. Luckily, this change of plans did not modify at all the project, as I finally did the same idea I had in mind from the very beginning.

This type of projects where big amounts of material and shots are manipulated, a good organization of time is much needed, as it can cost a lot of money to miss a deadline for the delivery of the work. The main thing to have in mind when working with a big team around is that you depend on others having done their work on time and others depend on you not missing the strict deadline. Luckily, tools like Shotgun make this process much easier as the producer can organize the structure of the workflow with more precision and communication.

3.2. SWOT ANALYSIS (DAFO)

	Positive	Negative
Internal origin	<p>Strengths</p> <p>Clear idea and objectives. High quality camera available. Prior knowledge of most of the software that will be used.</p>	<p>Weaknesses</p> <p>Little time for the project. Scope may be too high as it may be more difficult than I projected. First time using Nuke.</p>
External origin	<p>Opportunities</p> <p>VFX growing in popularity. Continuously growing sector. Large target audience.</p>	<p>Threats</p> <p>A lot of quality in other projects. High budget in the industry. A lot of offer in the sector.</p>

3.3. RISKS AND CONTINGENCY PLAN

In order to try to anticipate possible future problems during the different phases of project creation, a list has been elaborated with its hypothetical solutions so that these obstacles do not imply important time losses or even make the completion of the work not possible.

These potential problems are ordered from minor to major.

Risk	Solution
I am not finally able to have someone to record the voice-over dialog for the project.	I will record them myself with the help of a good microphone and voice effects.
Access to the software needed to carry out the project is lost.	If the university cannot resolve the issue, their classroom computers will be used.
Weather makes it impossible to shoot and there is no time to postpone the date.	It will be shot on set with adequate lighting and using green chroma key.
Computer crashes and does not allow to continue the project correctly.	The work will be done with the university's computers.
The first shots are taking much longer than the time predicted in the GANTT and the deadline is near.	A study will be made of all the shots and it will be decided where to take work off from future shots.
By mistake or computer error, all the TFG files I had until now are corrupted or lost.	A backup copy will be created on an external disk and updated at the end of each day's work.

3.4. INITIAL COST ANALYSIS

The budget section of this project will be analyzed separately, and it will be divided into the three usual sections.

In this budget, I will simulate how much money would I need to spend as a single artist to be able to make a completely professional trailer for a high-end production with the ability to spend large amounts of money. This will be done by evaluating the prices of software licenses, computer-related hardware, filming material, travel and logistic costs, permissions needed to shoot in a location and personal costs.

In pre-production, the idea, script and storyboard only involve personal costs, which will be added later. The main pre-production costs come in when we start to consider the locations and the travel costs.

Belchite is a partly destroyed town in Aragón, which was recommended to me by my TFG director, and I contacted them in order to know if it was possible to film in their famous Spanish Civil War ruins as they are very well preserved.



Fig. 11 Ruins of Belchite

I got an email back with details of the filming taxes they require to shoot, and I had to discard the option as they were too expensive for me personally, but as in this budget, I am calculating the hypothetical cost a production like this would have, the taxes will be included. The exact price is 200€ every 2 hours of filming. As I have calculated 3 shooting days at about 6 hours a day, the price will ascend to 1800€.

The next element to consider is travel costs, which will mainly be fuel and motorway tolls. To calculate this easily, I have introduced the complete journey from Barcelona to Belchite in the *ViaMichelin* app to know how much it will cost with fuel and tolls included. One way is worth 46 euros so I will divide by 4 hours, which is the duration of the journey, and include just one way back, as in this case I am considering staying there the whole three days.



Fig. 12 Price to pay for the journey from Barcelona to Belchite and back

SONY

Sony Alpha 7 III

Incluye: Sony Alpha 7 III, 2 baterías Sony NP-FZ100, Cargador, Correa, Tarjeta de memoria SDXC Sandisk 64GB 95MB/s

Desde: **33,43€ / día + IVA + Seguro**

Con sensor Full-Frame Exmor R BSI CMOS de 24MP, 5-Wa fps. Estabilizador de 5 ejes. ISO configurable Automático.

Tarifas

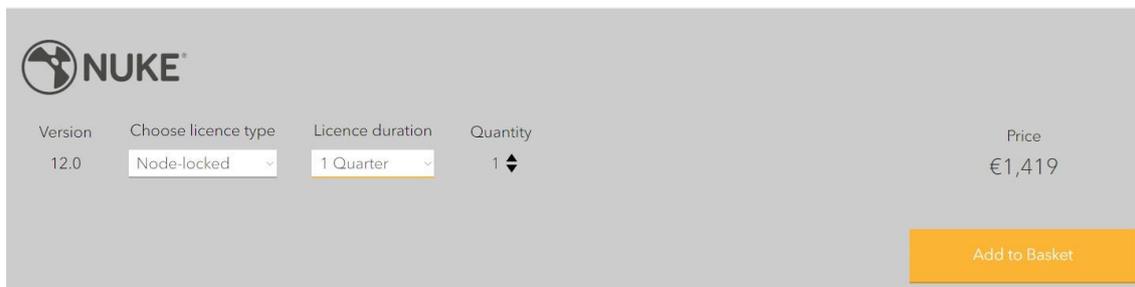
1/2 día*	1 día	2 días	3 días
42,00€	60,00€	90,00€	120,00€
60,00€/día	45,00€/día	40,00€/día	



Fig. 13 Renting price of a Sony A7III

In production, the main spending factor will be the actors, as they will work for three days straight. After a small market research, I have decided they will be paid about 30€ per hour worked. Another element to consider in production is the renting of lens and camera, which are cheaper than I initially thought they would be. The website *avisualpro.es* has been used to test and check these market prices.

Finally, in post-production comes the biggest spending. In this case, I will buy Nuke's node-locked license which is recommended for single users and is 1419€ for 4 months usage.



Version: 12.0
 Choose licence type: Node-locked
 Licence duration: 1 Quarter
 Quantity: 1
 Price: 1,419€
 Add to Basket

Fig. 14 Price of Nuke's node-locked license

Houdini's Indie license, although cheaper than Nuke's, is also an important fee as it is 269\$ which translates into about 250€.

PRODUCT	UNIT PRICE	QTY
Houdini Indie 1 Year Rental	\$269.00	1

Fig. 15 Price of Houdini's one-year rental

The last software to be purchased will be the Adobe Creative Cloud package, which will provide me with Photoshop to create the matte paintings, Premiere Pro to edit the clips and with After Effects to replace Nuke if a plan b is needed anytime. This package for individuals (not students) costs 60,49€ per month and four months will be contracted since that is the duration of this project.

As for the PC hardware I will consider the purchase of my own machine as it is the one that will be used for this work and it is worth about 1800€ considering all pieces plus the peripherals. The same will be done with my two computer monitors.

Finally, a voice actor needs to be contracted in order to record the voice-overs needed for the trailer and he will cost the same as the two actors that helped in the shooting phase.

To end the budget section, the personal costs will be added. In this case I have considered a 24€ per hour personal price. As this TFG is 12 ECTS credits long, it means that at least 300 hours will have to be spent on the project. As a result, I should hypothetically be charging 7200€ for the whole creation of the trailer as just personal costs.

PRE-PRODUCTION		PRICE PER HOUR	TOTAL HOURS	TOTAL DAYS	COST	TOTAL PROJECT COST
	Filming Permission	€100.00	18	3	€1,800.00	€14,969.32
	Travel (Fuel + Tolls)	€11.67	8	-	€93.36	
					€1,893.36	
PRODUCTION						
	Actor 1	€30.00	18	3	€540.00	
	Actor 2	€30.00	18	3	€540.00	
	Renting Sony A7 iii	-	-	3	€120.00	
	Renting 50mm Lens	-	-	3	€50.00	
					€1,250.00	
POST-PRODUCTION						
	Nuke License	-	-	120	€1,419.00	
	Houdini License	-	-	365	€250.00	
	Adobe Creative Cloud	-	-	120	€241.96	
	PC + Peripherals	-	-	-	€1,800.00	
	Monitor 1	-	-	-	€250.00	
	Monitor 2	-	-	-	€125.00	
	Voice Actor	€30.00	18	3	€540.00	
					€4,625.96	
PERSONAL COSTS						
	Personal Costs	€24.00	300	120	€7,200.00	

Fig. 16 Total budget

In conclusion, the whole trailer would cost almost 15.000€ for a cinema production company to make use of my services to create the trailer and I would be theoretically receiving about half of that budget.

4. METHODOLOGY

The methodology for this project will be divided in 3 sections, pre-production, production and post-production.

Pre-production is everything involved in the project that is done before the filming day. All projects always start with an idea. This may be a spark of inspiration or a well thought idea, but either way the project needs a general concept that will evolve during the preproduction stage.

Once the concept is clear, it needs to be translated to the paper. Normally, a literary and a technical script would have to be created in order to give words and images to the idea. In this project, however, as trailers are mostly open and do not intend to show a well-written story, I will not be making neither of those. The main reason is that for a trailer with no dialogue, a storyboard is the most adequate tool to know which shots need to be filmed and how the story will be shown.

When the storyboard is created with all the shots drawn, camera movements and annotations needed, it is time to think about the sound of the project. In this projects' case, the music will be chosen thinking about the meaning of the story and the emotion it wants to produce in the spectator. Once the adequate music has been chosen, the process will move on into Premiere.

In Adobe Premiere Pro CC, I will put the music and storyboards drawings together. In this moment, the *tempos* of the project between the music and the shots will be defined and it is mandatory that it is done right, as it may be troublesome to adjust it later on in the work when substantial progress has been made. These *tempos* will define the duration of every single shot and will help make the filming day easier, as it is much more straightforward filming knowing how many useful seconds of the shot you need. In Premiere, I will also animate slightly the drawings of the storyboard creating the zoom-ins or zoom-outs or recreating the camera movement that I will need to do in the shooting. Transitions between shots and voice-over text will also be implemented in this step.

The last thing that needs to be done in pre-production is investigating possible locations to go film. It is important to consider factors such as accessibility, proximity and if any document or permission is required to film there. It is also recommended to have a plan B near the destination in case anything happens, and the location is not available.

With the Premiere video exported, the second section of the project can start, as I will be ready to go filming. The production section will be divided in 2 or 3 filming days in different locations. The shots will be filmed with a Sony A7 III camera with a 50mm objective. The high-end camera will provide essential 4k quality image and it has the option of shooting at 120 frames per second to create a hypothetical slow motion afterwards. All shots will be recorded in both settings in case they are needed in the

post-production phase. I have decided to record with a 50mm lens because it is the one that least distorts the image. This means that when using camera-tracking techniques, the software will be able to interpret the information much better and I can always add the optical deformation when the project is finished editing.



Fig. 17 Sony Alpha A7 III

Once the plates have been revised and approved, the post-production section of the project can begin. Firstly, to see how the project will look like at the end, I will replace the storyboard drawings for the plates in the Premiere Pro project I created before in pre-production.

The first video processing step will be color correcting the plates from the same sequence. This is mainly to correct illumination differences between shots that are supposed to be at the same time in the story. These problems can occur when filming at different hours of the day, clouds passing and blocking the sunlight when recording or even shooting at a wrong exposure setting by mistake. When corrections are applied to the shots, I will export them as .EXR format and the effects and compositing phase will begin.

For all the shots, I will be using a similar workflow. Usually multiple rotoscopes will be needed in order to clean up things that I do not want to see on the plate such as cables, possible graffiti on the wall or planes that were flying in the sky at the moment of filming. Rotoscopes will also be used to separate the foreground from the background to be able to put elements between layers in the image. Once I have this step covered, I will start tracking the camera movement so I can later integrate the objects I am about to create. This process will go on creating the matte painting in Photoshop if the shot requires so

and making the 3D model and effects in Houdini if the clip demands it. These 3D and effects will be rendered in Houdini using the same camera I have extracted from the Nuke camera tracking node. Once I have these external objects for the shot, it will be time to jump back into Nuke to create the final version using the compositing tools it offers.

In the integration step, the main objective I will have is to make sure that the external element looks like it was filmed in the original plate. This will be achieved by adding the object in the desired position of the scene with the help of the rotoscopes and masks I have previously created. If the 3D object has been rendered with the extracted camera it will not need any more tracking, but the matte painting will, as it is just a still composed image. When everything has the correct movement and position, I will start modifying the light and shadows of the scene, so everything has cohesion and does not stand out from the other elements of the shot. Aspects such as sunlight, reflections, objects that emit their own light, particles in the air and camera bokeh have to be well treated and thought about. The last element to be added in Nuke is the depth of field blur to all objects in the scene that are out of focus.

When the compositing phase has been completed, all shots will be exported back into Premiere in *.EXR* format and will replace the plates I had previously in the montage sequence.

The last step in post-production is the color grading. This will be applied with color treatment tools such as Lumetri Color. All shots will have the exact same grading and will be treated equally and not like in the color correction step where I will need to treat every shot differently depending on its characteristics. The color grading will consist on modifying values such as saturation, brightness and contrast, color scopes, curves, etc. to achieve the specific creative look I am aiming for.

Finally, the last step is exporting the final video in high quality and the adequate resolution.

5. PROJECT DEVELOPMENT

5.1 PRE-PRODUCTION

IDEA

Pre-production always starts with an idea. The initial concept started with me wanting to create a thriller based on fictional characters in a post-apocalyptic environment, as it is one of the film genres that attract me the most. Luckily, I had clear ideas from the beginning, and this made the creation of the story much easier.

Since the beginning of the project, I had in mind that I wanted to use visual effects as the main pillar of the task and develop the idea around them. This was especially challenging, as I would have to be learning new software and techniques in order to carry out the project and this made organizing myself almost impossible, as I did not know how much time every task was going to take. However, I also knew that I wanted to do a good job in the production phase and not only just go filming for a day and then go straight into post-production.

PLOT

In order to make the production phase important in the project, I divided the idea in two stories that would go in a parallel way in the trailer. These two main sequences would require different locations, actors and different times of the day for lighting and narrative purposes. The first sequence is the one in which the main character wakes up and it would be based in the post-apocalypse and the destruction caused by something mysterious that would not be revealed in the trailer. On the other hand, the second sequence would represent the salvation and the good things that need to happen in the story.

Once I had these two main sequences clear, I developed the main script of the trailer.

The plot is based on a character that wakes up without any memory at all in a world that has been consumed by destruction and needs to know what has happened to try to save what is left. In order to do so, he will be guided by his main instinct and will follow a path and eventually try to find the magic cube that will have all the answers he is searching for. During the journey, however, his energy starts to fade, and the cube finally turns off before he manages to get to it, which means he will never get his memories back.

Another thing I had clear from the beginning is the use of color that I wanted in my project. The two main sequences would be clearly differentiated by the main color of the shots, as the first one would be based on pale unsaturated colors and the other one would be built around the color green. To make this even clearer, the cube and the eyes of guardian would have shiny green colors and the main character's eyes would also start being green but would go on to deteriorate and the saturation would go down eventually.

REFERENCES

After thinking about the concept of the project, it is mandatory to look for references of previous projects that have some similarities, as they may be useful and they will provide necessary inspiration. The projects I looked for were mainly trailers from similar film genres.

In order to know exactly which look and aesthetic I needed for the trailer, I created a document where I collected numerous images of items and examples of things I wanted to include in my project. These images will be useful when creating and integrating the 3D models or the effects that would be implemented in the final shots.

The item I gathered most images was the cube, as it is the most complicated 3D model in this project and the one with the most importance. The idea I had is that I wanted it to be black and textured with green lighting all around it, so I based my searches around that concept.



Fig. 18 Main reference for the cube

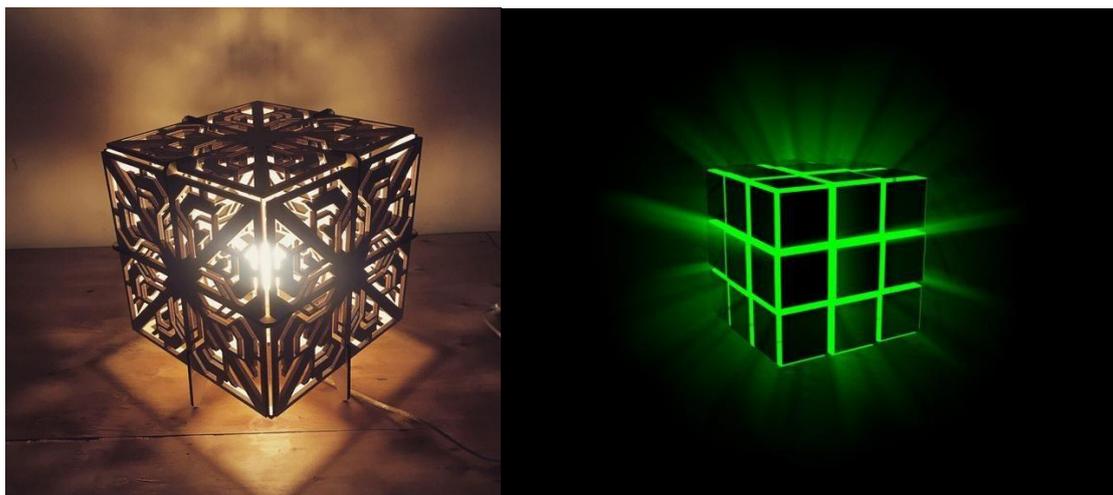


Fig. 19 Shapes and color references for the cube

I preferred to locate the cube in a forest, so I also searched for references of ways to integrate and film in this environment.



Fig. 20 Frame from trailer for The Book of Eli (2010)

Texture is something that I also looked for, as apart from being an inspiration of textures to put on some objects or onto the environment of the scene, they can also influence heavily the look and the locations of the different shots.



Fig. 21 Texture references for the project

I wanted textures to resemble old temples and mystic jungle ruins most notably in the forest sequence. I was aiming to make that sequence as mysterious as possible and these patterns are something I wanted to have in mind in order to achieve that specific look.

Finally, I considered different typography design for the different titles that will be appearing in the trailer. I searched mainly for films that used sans-serif heavy fonts with textures and interesting lighting for their titles.

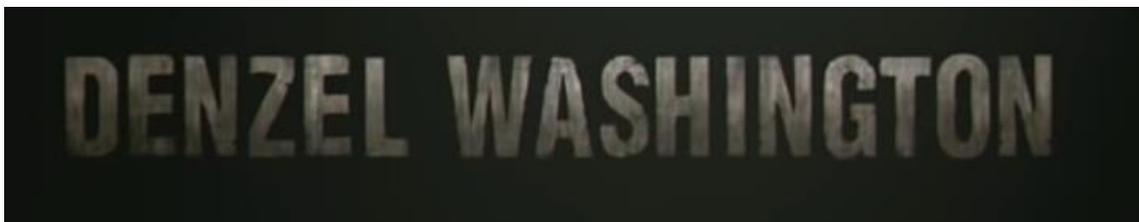


Fig. 22 Lettering for the main actor in The Book of Eli

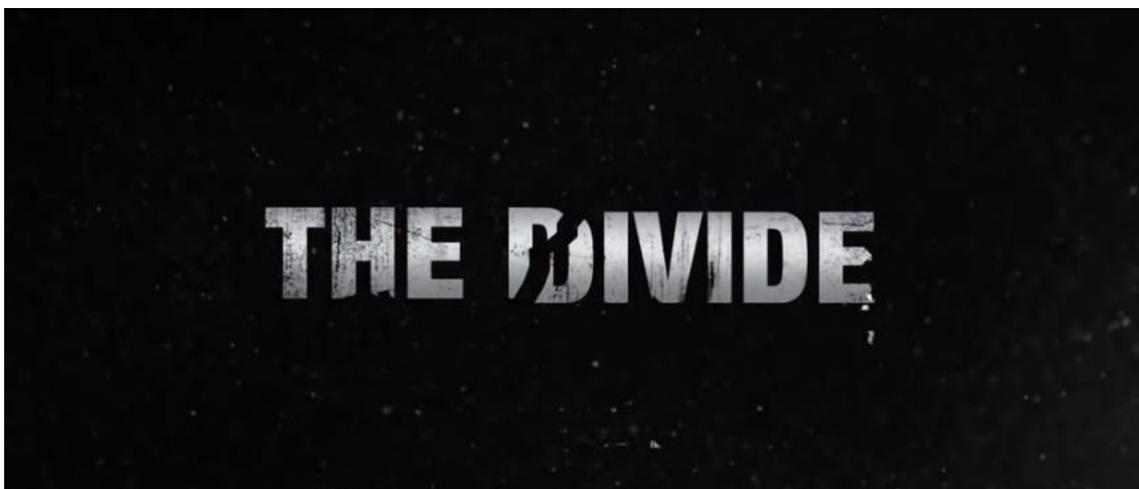


Fig. 23 Lettering for the trailer for The Divide (2011)

STORYBOARD

With the main idea completely clear, it was time to put it on paper and think about how I was going to translate the concept I had into the camera shots. The storyboard is the most useful tool to do this, as it offers many options to indicate camera movement, lighting, actor movement and many useful things I would need during the filming days.

In my case, I did not consider creating the storyboard with a specific software such as Storyboarder, as I thought it would take me too much time than the storyboard needs. It is only a guide that I would follow in the location where the shooting happens and it does not require any special design or well-made drawings, as it is made for myself.

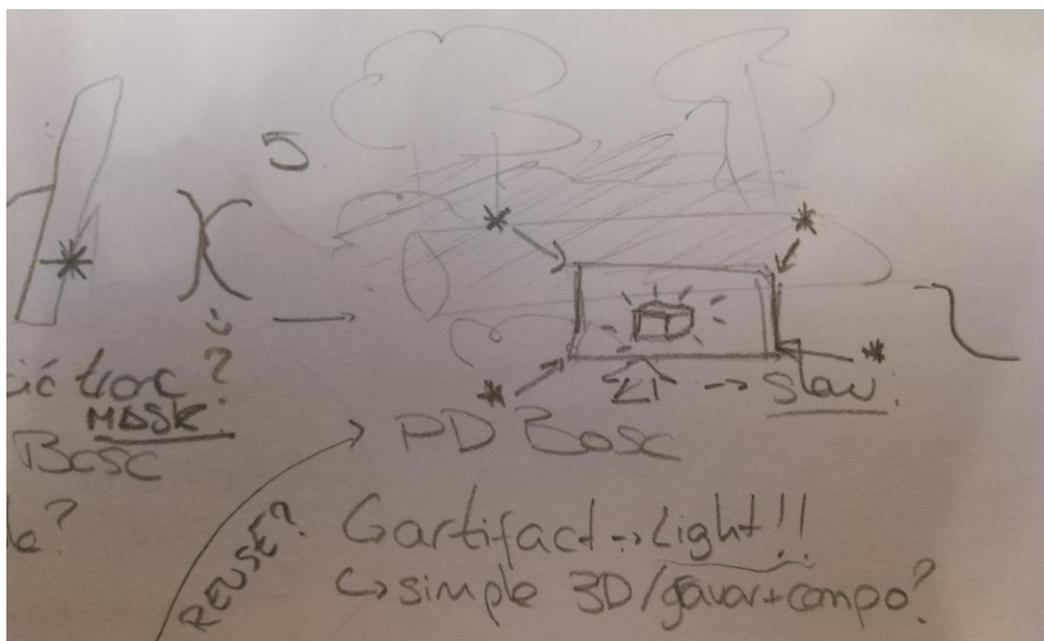


Fig. 24 Frame of the storyboard drawn by hand

However, making quick drawings did not mean doing the storyboard quickly without dedicating the needed time. I mainly focused on three main things in every shot. The first one is the type of shot it would be, for example detail, long shot, closeup...

Once the shot is decided, the camera movement and rotation had to be thought about in order to replicate it later. I always chose the camera movement thinking about the post-production phase. The last important thing to consider in every shot was the movement of the actors or objects inside of it.

Lastly, details such as transitions between shots and notes about lighting or possible effects were wrote down.

AUDIO

The audio part of the project is divided into three main sections.

The most essential one is clearly the music, as it is the guiding principle in which the theme and mood of the trailer will be based on.

The main dilemma I had from the beginning was using royalty-free music or not. Finally, I considered using music with rights for two reasons. The first one is that this project is a university task and will only be used for learning and academic purposes and I will not be profiting from it. The second reason is that this song fits very well into the mood I wanted for the trailer and I could not find any free songs that could match its quality. The work is *Emma* by Steven Price from the original soundtrack for the movie *Fury* (2014).

The second part of the audio section is the voice-over. This internal speech makes the trailer feel much more mysterious and, most importantly, avoids the need of having dialogs between characters in the trailer, which would mean a much more difficult production phase. In this case, I would need to bring microphones and advanced audio equipment in order to prevent problems such as wind noise, low volume from the actors' voices or interferences from other volume sources. As voice-overs are recorded in a silent environment, these complications do not occur.

Lastly, the third audio source for the trailer are the sound effects. They are very subtle in most cases, as the music and the dialog are most of the time louder than they are. However, the presence of these sound effects makes for a more complete listening experience and complement very well the shots and effects of the video.

MOCK-UP

This step of the pre-production phase is a key part of the project. This is basically where I built the advanced wireframe of what the trailer would be. What I mean by advanced is that everything would be put together in order to be able to just replace the clips of the storyboard for the future final shots. This process is known as offline editing.

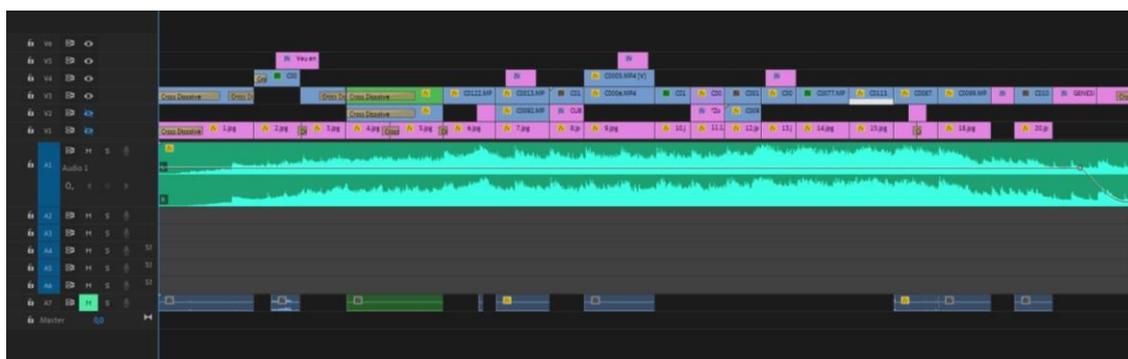


Fig. 25 Mock-up of the trailer in Premiere Pro

This mock-up was the main body for the trailer. I created a Premiere Pro project in which I imported the music and all the shots drawn in the storyboard I previously made.

With this material and the tools Premiere offers, I edited the video with the transitions I chose and, most importantly, calculating the timing of every clip in order to match the tempo of the music. This would go on to be extremely helpful because it made it much easier to record the footage on filming day because I knew how many exact seconds every plate needed.

The plan for this mock-up was that, once every shot had finished the compositing phase, they would replace their storyboard counterpart and I would apply the color grading to all of them.

LOCATIONS

The investigation of the different locations where the filming will take place is the last step of the pre-production process before production begins. As I explained in the [Initial Cost Analysis](#) section, the first thing that was suggested to me was going to Belchite to film the trailer. It was the perfect place for me to go shoot, as the buildings, assets and environment is exactly what I was aiming for. Sadly, it was finally impossible as I was not going to be able to get the filming permission and the expenses were too high.

When I finally discarded the idea of going to Belchite, I divided the search for locations into two different environments. As to make the two main sequences different from each other, I wanted to shoot them in different places with different colors, textures

and surroundings. All these locations had to be relatively near Barcelona, as I was planning to get there driving, and safe and legal to film in.

For the first sequence, which is based on the destruction of the city, the main priority was finding ruins of old towns or building that had been left without conservation.

The first location I chose was *La Mussara*, in Tarragona. This place is an old town from around the 16th century and has been abandoned since 1960. It has several collapsed buildings that could be useful for the trailer and the environment is interesting, as it is near a mountain cliff. Nowadays, it is a known place for hiking and mountain cycling.



Fig. 26 Church in La Mussara, Tarragona

Another location I chose to record part of the ruins and the main actor sequence was an abandoned farmhouse called *Ca l'Alemanya*. These ruins are located near Badalona and are an intermediate step from the ruins sequence to the forest one, as it has a bit of both surroundings. The most interesting part about this location is the presence of various arches surrounding the main building, which is completely collapsed and only a small porch is left.



Fig. 27 Ruins in Ca L'Alemany, Badalona

For the forest scene, I collected two main locations inside of Collserola, the mountain that wraps around Barcelona. The first one involves the actor sequence and it is an old aqueduct in the middle of the mountain. At first, it surprised me, as I lived relatively near the place and I never heard of it until this day. The most useful thing the *Viaducte de Can Ribes* offers would be its top part, as it is long and wide, and it is an open walking path.



Fig. 28 Viaduct in Collserola, Barcelona



Fig. 29 Viaduct from the top part

The last location was purely for the environment, as I planned to go to *Santa Creu d'Olorda* in Collserola and enter the forest from there and investigate possible places to film the scene of the cube and the girl. The Collserola environment is very monotonous and anywhere could be a good place to film if the light, shapes and colors of the scene are appealing.

5.2 PRODUCTION

In the production phase of the project, everything planned in pre-production had to be transformed into the plates that would later be used in post-production. Apart from the actors, I needed to bring the storyboard, the video mock-up of the project and the camera gear with enough memory to capture all the shots in each location.

Although I knew I had to prioritize the plates I would be using in the trailer, I went with the mentality of recording as much footage as possible. This is because if anything happens to the plate and I am not able to use it later on or simply that I am not convinced on how it looks or works in the final mock-up of the trailer, I would have to go back to the location with the actors to film again, which is be far from ideal. If I have more footage, the option of replacing a shot for another one is always there.

Moreover, apart from shooting the video footage, I also recorded and photographed in raw format a lot of textures and buildings that I could potentially use in the compositing of the shots or when texturing 3D elements before rendering in Houdini. When going to film to a precise location, it is important to spend time getting a lot of information of the surroundings and repeating the storyboard shots at least two or three times in order not to run out of options in post-production.



Fig. 30 Texture taken by photographing a wood plank

When taking photographs of assets in a scene, it is essential to shoot them in a raw format if the camera supports it. Raw formats usually weigh much more than a compressed image format such as JPG or PNG, but they contain a lot of useful information in color and lighting that the user is able to recover in software like Adobe Camera Raw.

CAMERA AND SETTINGS

For this project, as I have previously mentioned, I recorded all my footage with a Sony Alpha7 III, which is a mirrorless camera able to film at very high quality due to the high sensibility of its sensor. However, this camera also stands out in the market for its capability of configuring different profiles. The lens used was a Sony 50mm F1.8.

IMAGE PROFILE

The two main profiles I used in this project are SLog2 and HLG2. The most notable difference between these two profiles is the dynamic range of the footage they provide.

SLog2 is the most flexible profile of the two, as the logarithmic compression allows to get more information from the scene in order to be able to recover it with LUTs in postproduction. HLG2 (Hybrid Log Gamma) has a bit less flexibility in color correction and color grading but offers precise color reproduction and more saturated colors than SLog2. The latter is a profile that can be used in a project without the need of color management in post-production, but with SLog2 it is almost mandatory to modify the grading.

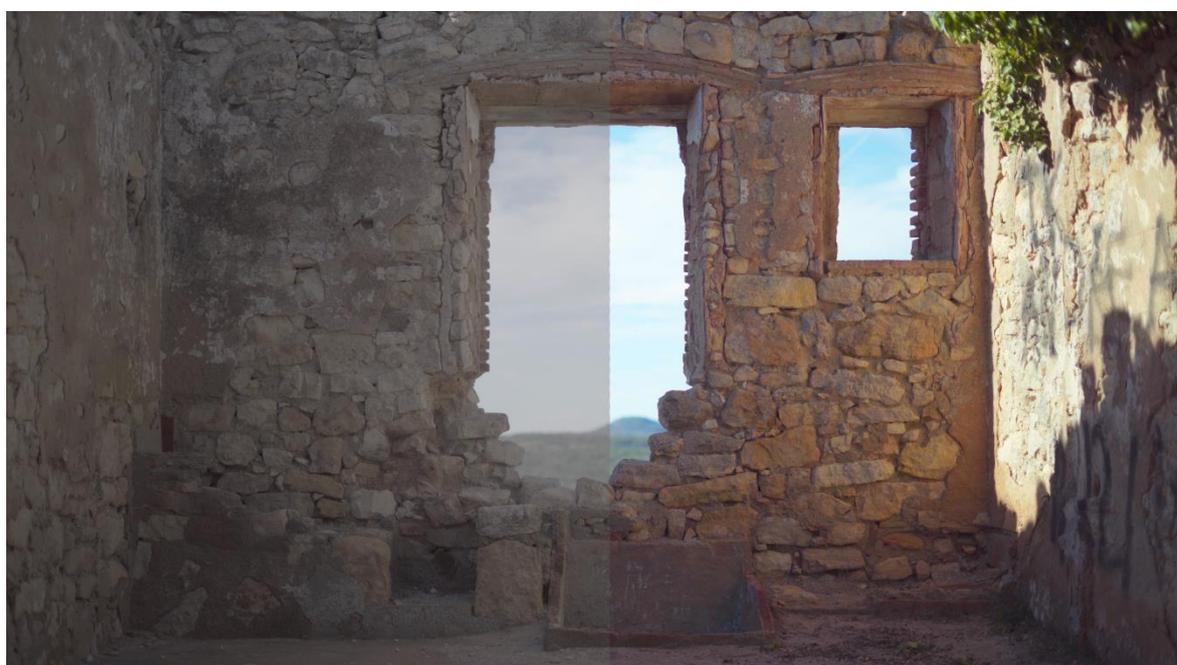


Fig. 31 Right: shot in SLog2, left: shot in HLG2

I decided to film sequence for the actor and the ruins in SLog2 and the forest and cube part in HLG2. This is because I knew beforehand that the forest would be very saturated and with lively colors, so I did not need that much flexibility to modify.

IMAGE SIZE

The other main setting that needs to be decided is the image size. Most of the shots were recorded in 4K (precisely 4K UHD – 3840×2160). The ability to shoot in this size meant that, later on, I would be able to modify the position of the frame or also create camera movements such as zoom-in, zoom-out or a gentle traveling. As the final resolution was planned to be lower, I would not be losing perceivable image quality applying these modifications.

The only shots that were not shot in 4K were the ones in slow-motion. The Sony A7 III is capable to shoot slow-motion at 120 frames per second, which is very useful, but the maximum image size it supports with these settings is FullHD (1920×1080). This configuration is still impressive, as cameras with the ability to film in 4K while shooting at such a high frame rate are much more expensive and rarer.

The last thing to consider in relation to the image size is the aspect ratio. The A7 III shoots in 16:9 aspect ratio as I was not shooting with any anamorphic lens since they are almost always used in professional scenarios. In order to simulate the footage of this type of lens used in the cinema workflow, I will later export the video as 21:9, which is approximately the aspect ratio those lenses provide. Nuke offers a particularly useful tool called *masking ratio* that lets you know how the video will be seen in the anamorphic format while working in 16:9.



Fig. 32 Masking ratio tool in Nuke

This way, the user is able to see what part of the footage will appear in the final version and makes the compositing workflow much easier, as it avoids having to work on parts of the shot that will not be seen in the last export.

FILMING

The first location I went to was *La Mussara*, as was previously planned. I wanted to be there early in order to have enough time to capture different types of illumination. One thing I read about this place is that, in cloudy days, it is usual to find foggy weather and makes the environment have a sinister and scary feel to the scene. However, once we arrived, it was as clear as the sky could be. Although it would have been a good opportunity to film impressive shots, a clear day actually made things much easier with lighting and cohesion with all the different plates.

In this location, the trickiest shot to film was the one with an important backlighting in which the main character starts losing his mind. For this shot, I placed the actor in an opening between two collapsed walls and filmed him with the light coming straight to the camera.

The location for this shot was the most difficult thing to find that day of filming, as I wanted specifically an opening with a strong light coming from behind. Luckily, we finally found this place which actually met all of my requirements.

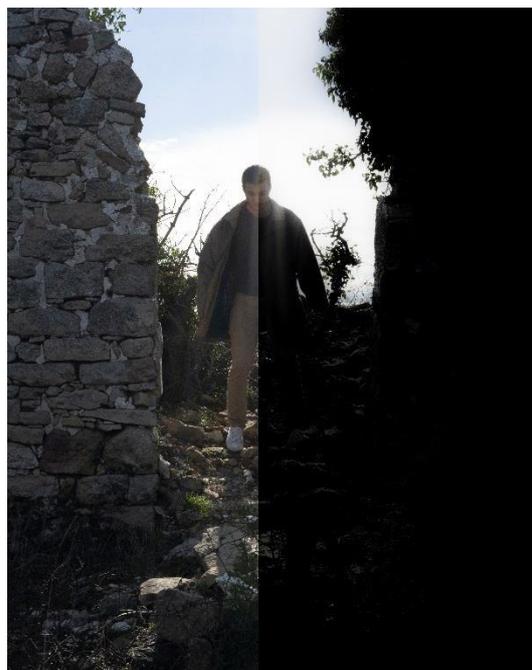


Fig. 33 Backlight shot without and with the correction

For this shot it was essential the use of SLog2, as it was a difficult illumination and I needed the maximum amount of information in order to manipulate it post-production. The use of this color profile would mean that the colors would be very near gray level and that the backlighting would appear only once I had processed it with color correction in Premiere.



Fig. 34 Me filming the forest sequence

As for the next location, I went to the Collserola Mountain to film the forest sequence. This time I also had good clear weather which helped making light in the forest more interesting than the diffuse lighting that cloudy days provide. The shadows of the elements of the scene were also really useful and I was able to play with them to introduce them in some way in the shots.

For this sequence I used the HLG2 color profile, which gave me more saturated colors and more precise information of the scene. A lot of shots had to be taken in order to get the one I liked the most because of practice with the actors and positioning them with the camera.

The last day of filming was the one I went to *Ca L'Alemany* in Badalona and to the other side of Collserola. These shots were also filmed in HLG2, as they were part of the forest sequence and advanced ruins shots in the trailer that did not need that low saturation setting.



Fig. 35 Main character in Ca L'Alemany

Luckily, I also had good weather there and the light was spot on for the shots I wanted to record. Once we got to Collserola, I recorded a lot of nature footage in case I ended

up cutting some shots because of unexpected problems and I wanted flexibility to choose when editing the main sequence of the project.

Finally, the last step that had to be done before starting with the post-production phase is ordering all of the plates into folders and naming them properly to make the workflow much easier, as it can get very messy when managing many files in the same project.

I created different folders for raw clips, assets, photos, TFG documents, Nuke projects and Houdini projects. Moreover, I chose a naming system for all the shots and their future versions that would follow the same structure – Sequence, shot number, one word or phrase description, state the shot is in (plate, rotoscope, comp, out...) and the version. An example of a name would be Ruins_03_Church_Plate_v01. This way, all the shots would be classified by sequence, number, state of the clip and the version. Adding the small description to the name would make me remember quickly which shot that is without having to open it.

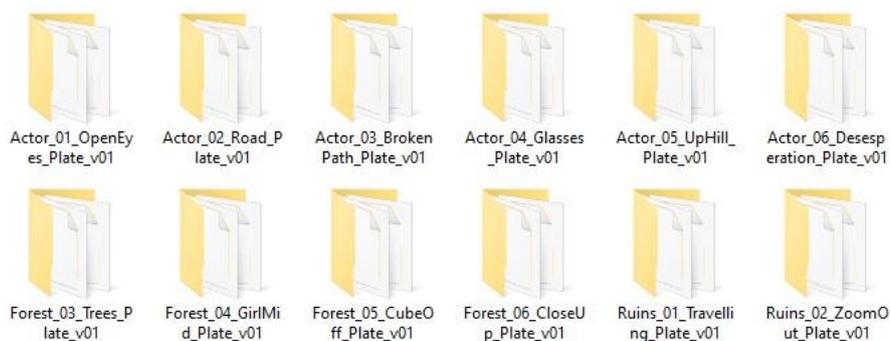


Fig. 36 Folder organization for the project

In order not to modify the original folder when creating new versions of the shot in the post-production process, I created a *versions* folder for each shot. This way, I was able to save the different versions and *.EXR* sequences of the shot to visualize my progress.

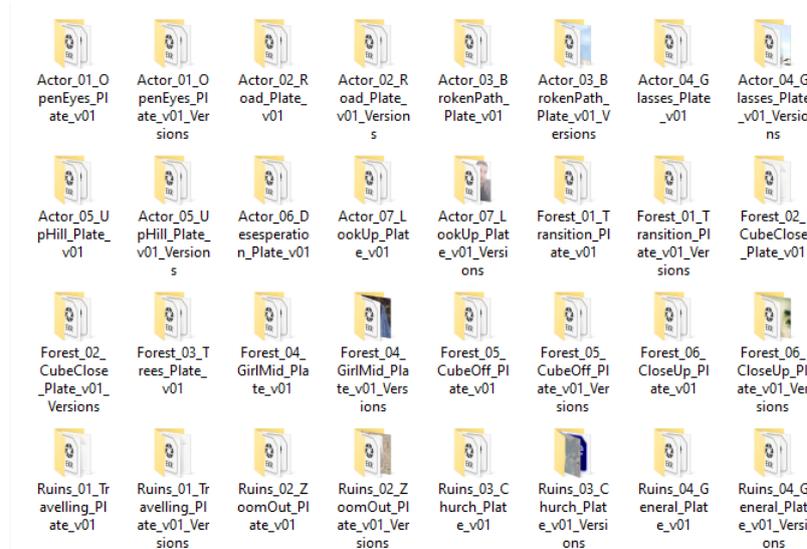


Fig. 37 Folder organization with the versions variant

5.3 POST-PRODUCTION

PREPARATION AND COLOR CORRECTION

Before beginning the post-production process, the first thing I did was replacing the storyboard photos in the offline video mock-up for the plates I recorded in production. In this process I was cutting the shots, as I had previously recorded for longer than it was supposed to finally last. This gave me flexibility to decide which parts of the shots I wanted to keep or not and which parts suited the trailer best.

With all the clips together, it was much easier to detect illumination problems between consecutive clips of the same sequence. To solve this, I used the Lumetri Color effect to modify every clip individually until all of them were working well together in aspects such as lighting, colors and exposure. All these variations derive from the way of recording the scene.

The next step before getting into Nuke is exporting every clip to EXR sequence. Once I had the final shot decided, it was necessary to export it to EXR, as it is a format that retains a lot of information such as alpha channel and bit depth and works perfectly with Nuke. To do this, I put every clip in its own sequence in Premiere Pro and exported it in 4K if possible with one second of margin from the beginning and ending of the clip in order to have flexibility also in the compositing phase.

I have tried to put plenty of emphasis on flexibility in this piece of work. I think the ability to constantly change and adapt to the problems and turnarounds is mandatory for a project like this to succeed with just one person. The lack of options when encountering important issues can cost a lot of time and resources and it may mean missing the deadline and not being able to finish the trailer in time or having to deliver a subpar project.

MATCH MOVING

Once I had all the preparations finished and the plates ready, I was able to start with the post-production part of the TFG.

The most important aspect of a video sequence is that, unless the camera is absolutely static, it will always have some kind of movement. In order to integrate anything into the plate, the first piece of information we need to know is the precise movement of the camera and the different items on the frame. There are many techniques to extract this data and, in this project, I have primarily combined three of them.

2D TRACKING

The 2D Tracking is the simplest technique of the three. Basically, the software calculates the position in the X and Y space of the object in the scene. In other words, this way of tracking only exports the information of the horizontal and vertical movement.

But how does the program detect the movement? The first thing to do when starting to track is deciding a point of contrast in the image. Then, Nuke will apply contrast modifications to the lighting values which the user does not see, and the tracker will be following that point for the period of time the user requires.

This process can be more precise if more trackers in the same tracker node are combined, as the software will have information of what is happening in the scene in other points. However, this can be problematic and may lead to errors when calculating the movement in places where the objects move similarly but not the same way.

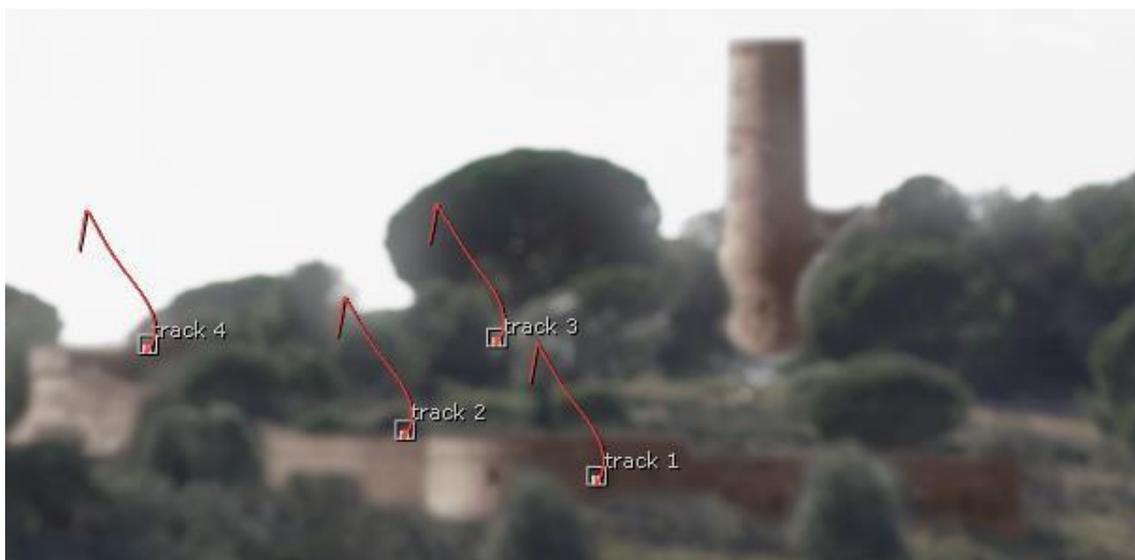


Fig. 38 Four tracking points with their tracked path

PLANAR TRACKING

The planar tracker is based on the 2D trackers but, as it combines a minimum of 4 points in tracking, it can also calculate aspects such as the perspective, shear, or the changes in the scale of an object. This is particularly useful when match moving images in surfaces if the shot changes the perspective of an object, since 2D trackers alone will not be able to know how it is being modified.

To planar track in Nuke, I used the option *planar-track this shape* that the NukeX version offers. When creating a mask and selecting this option, the software will place trackers and will start calculating frame by frame how the shape of the mask that is placed on a surface moves and changes.

CAMERA TRACKING

The camera tracking or 3D tracking is the most complex tracker of the three and it is used for more complex shots where the 2D and planar trackers are not enough. As for my project, this tracker was used mainly in the shots that required integrating 3D objects and overly complicated tracking structure that the 2D and planar could not complete.

The two main ways this tracking technique is called basically describe its main function. It represents the movement in a 3D space instead of the 2D space of the plate and it extracts the information of the camera, as it creates a virtual camera that will move the same way as the physical one moved during the filming of the shot.

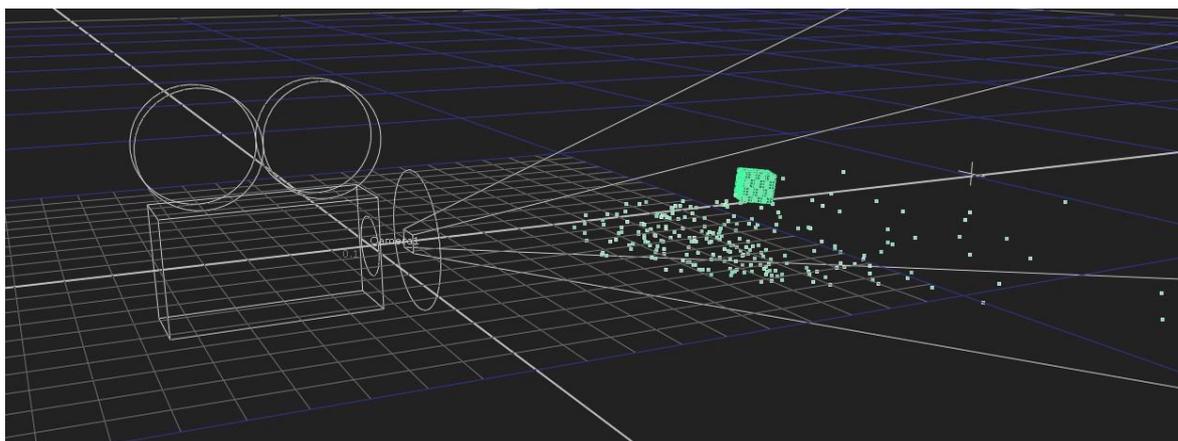


Fig. 39 Nuke's 3D space with the provisional cube

In Nuke, the way this procedure works is by creating a group of nodes that will work together to create a 3D scene of the elements in the shot.

The first node is the Camera Tracker, which is the one that calculates the movement and rotation of the camera by tracing a specified amount of points in the image. This node is the one that I could manipulate the most, as the user can help Nuke by specifying aspects like the camera model, the sensor size, focal length and the length distortion.

Most of the time, the more you help Nuke with known data in the node parameters, the more precise the tracking becomes.

This Camera Tracker node passes the information it gets from tracking the sequence to the recently created virtual camera, which is represented by the circular node called Camera. This camera, the point cloud created from the camera tracker and the lens distortion creates the scene inside of the Nuke's 3D space. All of this is then rendered by the Scanline Render in order to be seen in the 2D viewer.

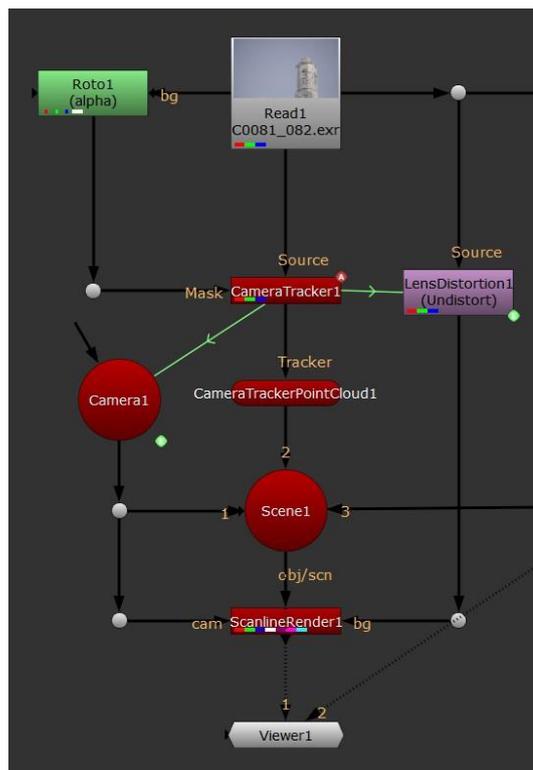


Fig. 40 Node group for 3D tracking

In the case of this project, the lens distortion is a minor problem since I recorded all my footage specifically with a 50mm lens to reduce the problems this distortion can create. This optical modification is much more exaggerated using lenses with shorter focal lengths and must be thought about when integrating objects or images that do not have that distortion.

With the tracking completed with the error rate adjusted, I could start making tests creating 3D objects and placing them between the point cloud to make that object move with the objects filmed in the scene.

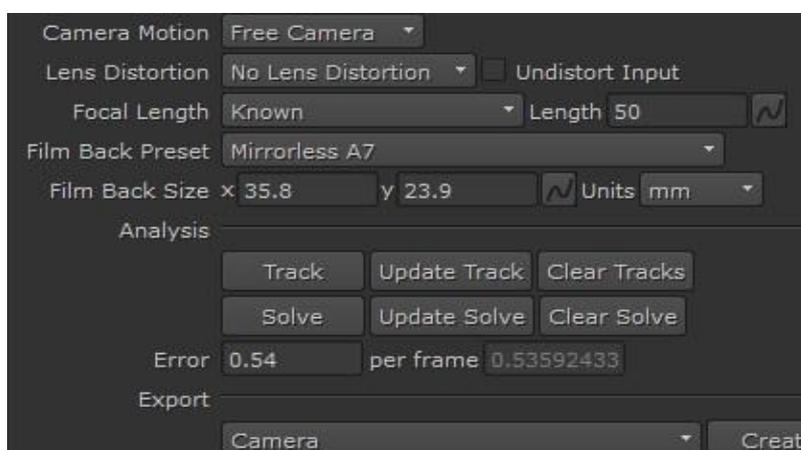


Fig. 41 Exact parameters with the camera information in the camera tracker



Fig. 42 Provisional 3D cube to test the quality of the tracking

Once the movement I saw was correct, the camera was ready to get exported for when the 3D part of the workflow of the shot arrived.

CLEANUP

The cleanup is the starting point of the creation of a shot in post-production. It consists on removing unwanted information of a shot such as cables, graffiti, imperfections or errors made in the production phase. The main Nuke nodes I have used in this project for the cleanup have been the Rotopaint and the Inpaint. These nodes, mainly Rotopaint, were remarkably familiar to me due to my After Effects and Photoshop background knowledge, as they have cloning and blur options to remove information and placing other information above it as well as the Adobe software.

Most of the time, this task is underappreciated by the general public when done well, as there is no way to tell if a shot had any problems that had to be cleaned up when watching the final product. However, it is absolutely necessary and when not done properly, the shot can fall apart, as it is not acceptable to have errors not cleaned up in professional productions.

This next shot is one of the clearest cleanups I have had to do in this project and will be useful for me to explain the process.



Fig. 43 Plate of the shot without the cleanup

I really wanted to shot these ruins, as the shot was just as I envisioned in pre-production, but the graffiti needed to be cleaned, as there was no way to put this shot in the project with the paintings in it.

With a Rotopaint node and patience, I started cloning the parts of the columns that were clean into the graffiti and it finally erased the painted parts. I usually compare this process to physical make-up, as it works the same way; adding new objects and painting above what you want to correct or modify in order to hide or improve what is underneath.

In this case, all the columns had paintings, but the column on the right was the hardest to clone, as the graffiti is much bigger and there is little column visible to get information from. When finished, I obtained the painted column with the useful information.

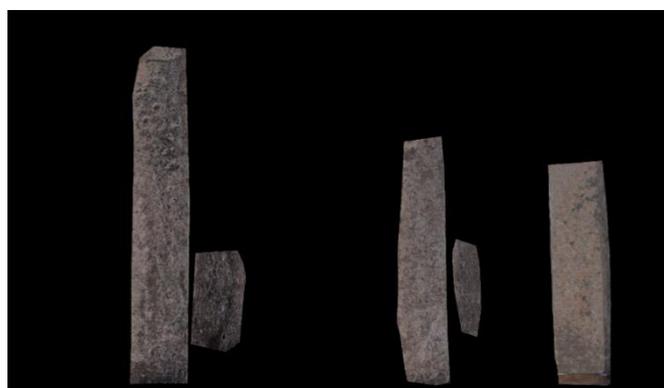


Fig. 44 Columns cloned with Rotopaint

When applied above the original shot with a subtle feather in the mask, I finally had the columns cleaned and with no visible difference between the original piece and the cloned one.

The last step of this procedure was to animate the placed columns, as they were just a static image and did not yet have the movement of the plate. With a planar track putting four trackers on each vertex of every column, the columns moved precisely with the camera and the graffiti's were no longer visible at any moment of the shot.

It is important to do the cleanup process before adding any lights, color modifiers or effects, otherwise the cloned object would not receive any of those inputs because it would be on top of them. Nuke is a very flexible software and gives the creator a lot of options to do one thing, however, the pipeline workflow and the order of the inputs always needs to be respected.



Fig. 45 Clean plate of the shot

The other main use of cleanup techniques in this TFG, was the digital make-up of the actors in the trailer. It can be a bit tedious, as it requires a lot of time because it is much more complex than the previous example of the columns.

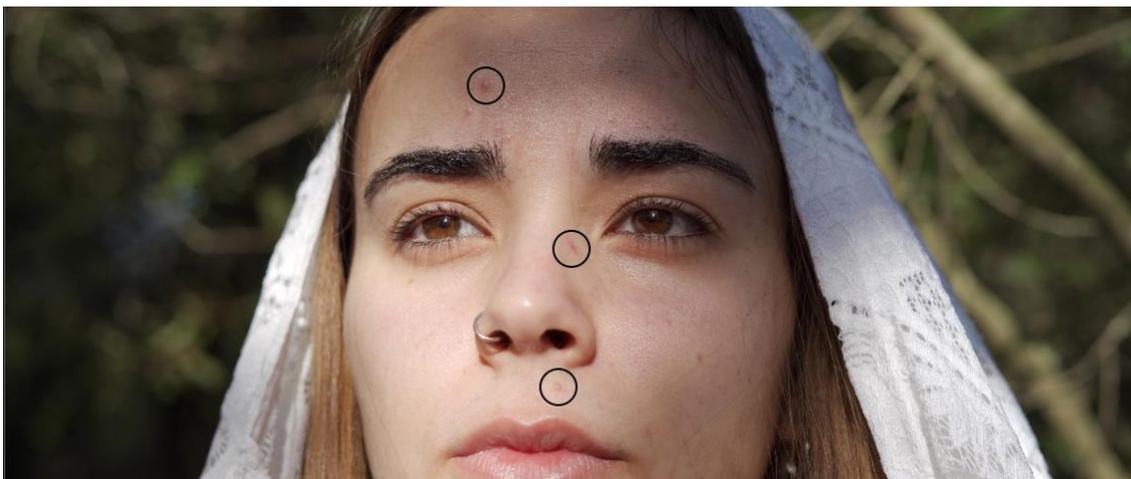


Fig. 46 Plate of the last shot without the cleanup

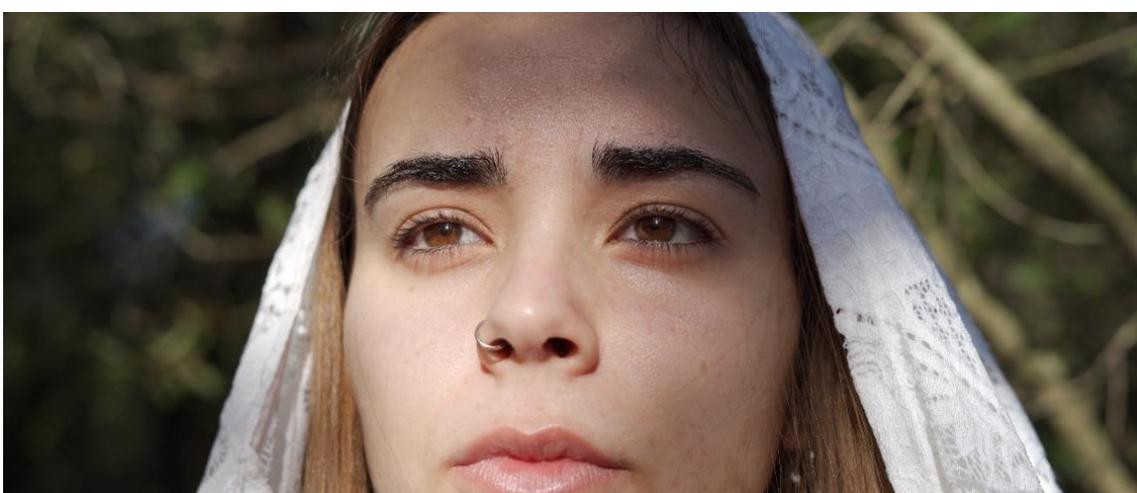


Fig. 47 Clean plate of the last shot

The main difference between the columns' shot and this one is the change of lighting in the shot. When creating the clone of the column with the Rotopaint node, it was necessary to freeze the frame in order to be the same clone for the whole shot. It worked perfectly because the plate did not have any change in lighting or objects passing on top. In this case, if the same process is carried on, the clone will have the lighting in which has been created initially and will not adapt to the changes of the shadows in the shot.

In order to make this cleanup possible, I used the Inpaint node. This tool offers the ability to adapt the content of an alpha channel based on the surroundings placed on the node parameters. What this means is that when the spot to remove is masked and tracked, the tool will change the content of the spot for information similar to its surroundings. This will allow changes in lighting because when the spot enters a shadow zone, it will detect that the near parts of the mask are changing and adapt to it. This tool makes this process much more automated and simpler than it would be cloning every frame with the Rotopaint tool.

The Inpaint tool can also be used to remove elements such as insects, birds or planes flying in the shot. The clearer the sky is, the easier it is to remove the item.



Fig. 48 Insects flying over the shot of main character

Another example of a necessary cleanup process is removing buildings and objects that should not be there due to the timeline or the location of the fictional shot in the trailer. In this case, as I filmed in Collserola, there was a communications tower hidden in the shot and had to be removed.



Fig. 49 Communications tower in the background



Fig. 50 Communications tower removed and tracked

ROTOSCOPING, LUMA KEY AND SHUFFLE NODE

Working with the alpha channel is most of time mandatory to integrate elements into a shot or to place a character into a fictional space. It is also needed to place any object behind a part of a shot. There are multiple ways to treat with the alpha channel, but the most used ones are roto-scoping, chroma key and luma key.

Rotoscoping is one of the major techniques in the postproduction process. It consists in extracting the alpha information with a moving mask in the shot. In big productions, it is usually outsourced onto another company specialized in roto, as it is a process that can take an extremely long period of time. Roto can be made frame by frame or every x number of frames and correcting the interpolation between them. There is also specialized roto software such as Mocha or Silhouette that can track complex shapes automatically, although the user's input for corrections will always be needed.

In Nuke, roto-scoping is done with the Roto node. This is one of the most important nodes in the program. Masks are created the same way as in After Effects, Photoshop or any other similar software, as most of the time the pen tool is used to draw them.

There are multiple ways to animate the roto node in order to have a moving mask. As previously stated in the [match moving](#) section, basic 2D tracking can be applied to a roto the same way as any other element in the scene. If the roto shape only needs a horizontal and/or vertical movement, this is a valid solution. However, I persist, there will always the need to correct the little imperfections of the roto to get a completely perfect mask, because, when the roto has small problems, they are often very visible. If the basic tracker node is not enough for the roto movement because of its complexity, the [planar tracking](#) tool that NukeX offers can be useful.



Fig. 51 Roto of the protagonist's eye

When none of these tracking tools can be used due to the complexity of the mask or movement of it, the mask will need to be manually animated. This means having to move the points of the mask frame by frame in order to follow the shape. To save a bit more time, the compositor can choose to animate it every 5 or 10 frames and let Nuke interpolate the rest, although some small tweaks may be necessary.



Fig. 52 Roto with a complex shape with and without the added background

In this project, almost every shot has required roto. The one in the image above is a complex shape, but, as the camera only moves in the 2D space, I was able to track the key points with a tracker node and it worked very well. The stone wall in this example is a static element in a moving shot, which means that the movement of the camera is enough to move the roto. However, if the element shifts with its own movement in the shot, this tracker node and planar tracking technique would be much harder to implement.

Sometimes, creating multiple masks for a single moving element can make the process much easier, as they can merge with each other with different blend modes. When the shape of a roto is too complex, it can get difficult to have everything under control, as there will be many points to move and Nuke can show problems managing it.

There are multiple factors that can make a roto either look realistic or like something was badly stuck on top of the shot. The *feather* option is especially useful to achieve the former. This parameter allows the mask to fade and not end with a straight line. Almost every roto needs some feather, as perfect straight lines are hardly seen in recorded footage due to motion blur, defocus or low image quality. The feather falloff controls the distance in which the feather starts to fade.

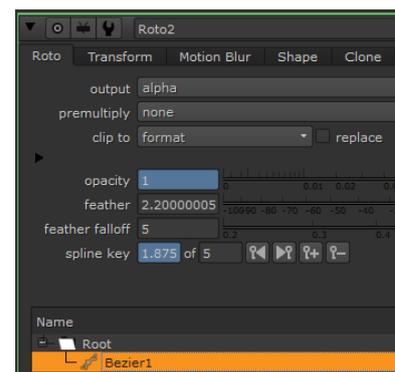


Fig. 53 Roto parameters in Nuke

The chroma key technique has not been used in this project.

There are two main reasons for me not to use the method in this work. It is mostly known as *green screen* and it requires complex equipment such as good lighting and positioning and the green screen itself must be big enough to cover the character or the object to maintain in the scene. The other reason was that I did not really need it, as the surroundings of the locations I went to film were enough for the trailer. The

environment could most likely be improved with the use of a chroma key behind the characters, but combining the two reasons, it was not worth using the technique.

A useful approach for treating with alpha was the Luma key. This technique works the same way as the chroma key but substituting the green or blue color for the light levels of the shot. It is especially useful for removing the sky to place another one. Several nodes in Nuke such as the keyer node or Keylight can perform it.

The main problem for me with Luma key was that, as I was shooting in sLog settings in most shots, the contrast of the image was exceptionally low. This meant that the light levels were similar throughout the image and that the tool would not work very precisely.

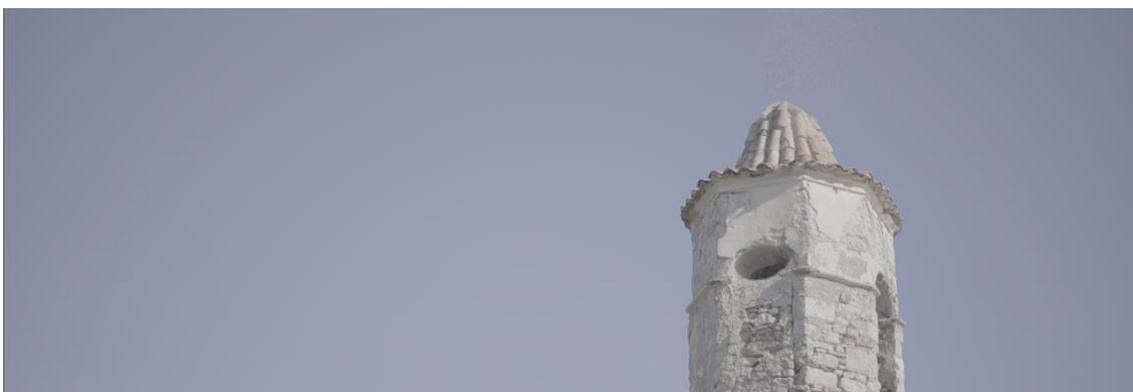


Fig. 54 Plate of the shot with the church

The best solution I found was to switch the idea a little. Instead of getting the high levels of light, the way I got the information of the sky was with the other parameter that it has the most of, which is blue levels. As most video compositing programs, Nuke divides the visualization in 4 channels: red, blue, green and alpha. This will be of great use in this process, as knowing the levels of every channel will be important.

This technique works around the Shuffle node. This tool allows the artist to pass information from one channel to another, which means that, in this case, if the sky is completely blue and the blue channel is shuffled into the alpha channel, we will end up with a transparent sky.

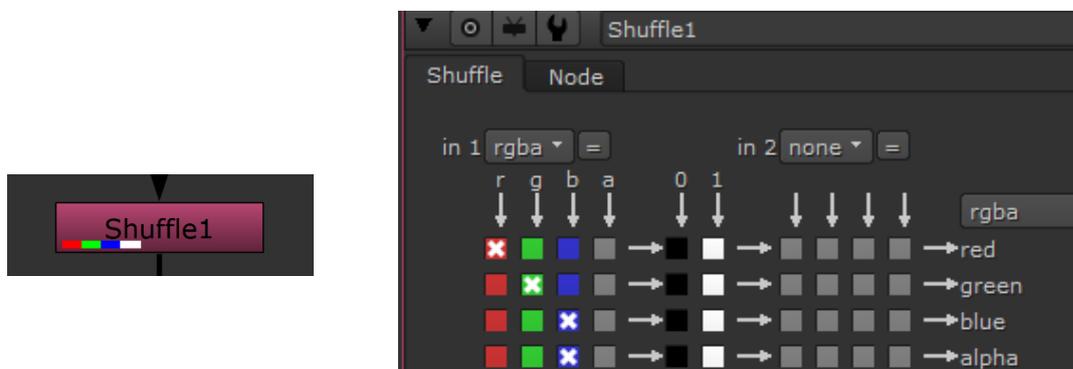


Fig. 55 Shuffle node parameters in Nuke

Before applying the shuffle, however, we need to make sure that the values of the blue channel have maximum level in order to have a completely clear background. With the help of color correction tools such as the color correct node or the color lookup node, we can enhance the blue and lower the volume of red and green levels.

The rest of the shot will get the complementary color of the one we want to extract, so in this example, the church turned yellow which complements the blue.

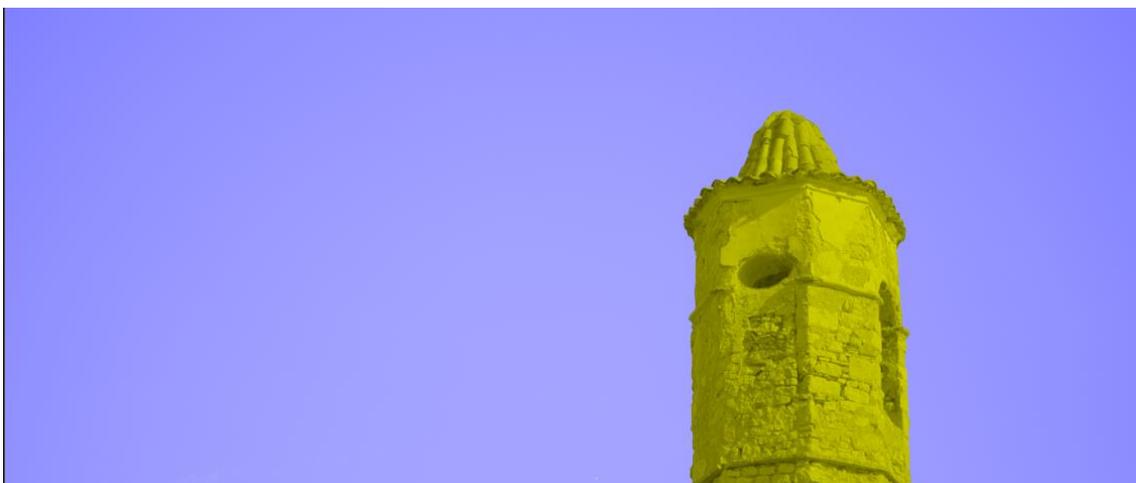


Fig. 56 Shot with the Color LookUp parameters ramped up

Finally, with the use of a garbage mask to quickly discard the parts of the shot that are not needed, only small retouches have to be made to get the final result, which is the black and white alpha channel with just the church.



Fig. 57 Alpha channel with the shuffle node passing the blue channel to the alpha

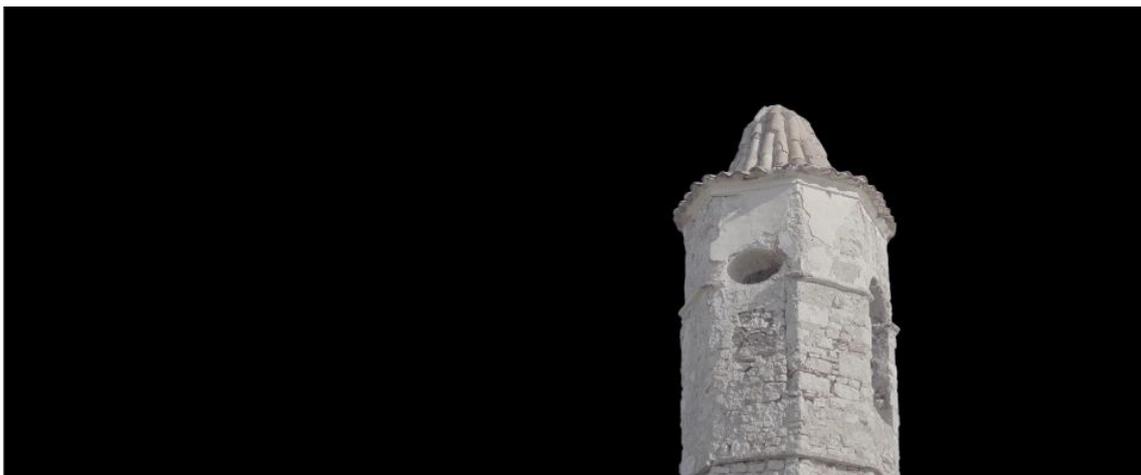


Fig. 58 Church with the completely transparent background

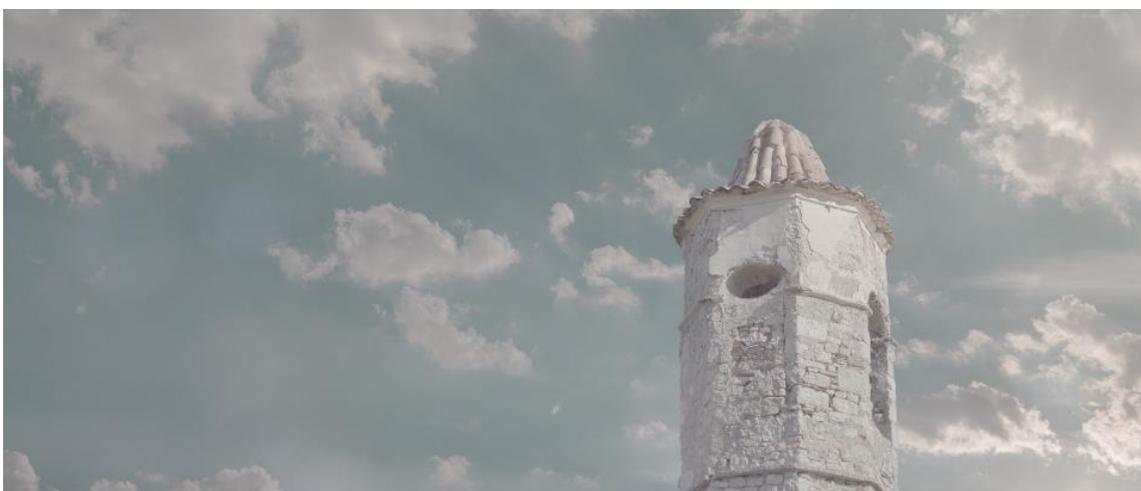


Fig. 59 Shot with the sky replacement completed

The most complex shot in relation to the alpha channel was the one in which the male character starts going mad. I had to combine multiple manual rotos with a luma key in order to get the result I wanted.



Fig. 60 Clean plate of the uphill shot

The main problem with this shot is that the sky is clearly separated in color from the foreground but the mountains on the bottom right are very similar, so they cannot be taken out with a luma key or with the use of a shuffle node. Instead, with the help and advice from my tutor, I decided to divide the work into different parts.

I started with the shuffle node technique, enhancing the blues and separating everything from the main character. As it can be seen in the image below, the information of the mountains in the background is still there due to the similarities in color with the actor.



Fig. 61 Shot with the sky information discarded but with the mountains still in the background

A garbage mask with a *from* blending mode was created to get rid of the information I did not need. I also corrected manually the luma key with rotos in elements like the hands or the head which were contaminated by the light and were erased with the previous shuffle node. It is always necessary to tweak and perfection the automatic procedures, as they help save a lot of time but are never as precise as a manual roto controlled by the artist.

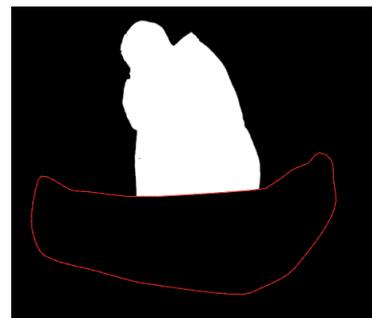


Fig. 62 Garbage mask



Fig. 63 Procedure of correcting the errors from the luma key

With this procedure, however, I also removed the foreground from the character, so the next step was to roto the mountain nearest to the camera and match move it with some track points located in contrast points.



Fig. 64 Shot with the upper part of the character finished

All masks had to have a bit of feather so they would be correctly integrated later with the digital matte painting. Moreover, the edges had to be removed with erode and edge blur nodes.

Now, with the upper part of the character and the foreground mountain removed from the background, the most time-consuming process started. I had to manually roto frame by frame the character's legs and the interior of them. This procedure was very tedious, and I spent about 16 hours (two full days of work) creating the rotoSCOPE. Thankfully, it was worth it, as the result was very satisfactory, and the mask did not have any meaningful problems. It was at this moment when I realized why most professional postproduction companies outsource this process to a specialized firm, because otherwise, it would just take too much time from the team members.



Fig. 65 Final alpha channel with all masks finished

At this point, the shot was prepared to be integrated with a digital matte painting to place the scenario in a fictional place.

DIGITAL MATTE PAINTINGS

Digital matte paintings (or DMP) are used in practically every big production and they are essential for a good compositing work. A DMP is a 2D (or 3D) image created by overlaying different images to recreate a new fictional space in which the shot will be placed.

The software used to create the DMPs in this project has been Adobe Photoshop. It is the main industry standard for everything involving photography, image compositing and image editing and it is such a powerful software that has compatibility with other video programs such as After Effects (which is also from Adobe) and even Nuke.



DMPs can vary from relatively simple sky replacements to a completely new set extension using masks, chroma keys or other techniques.



Fig. 66 Sky replacement

Image modifications can be made in Photoshop using effects such as *Hue/Saturation*, *brightness and contrast* or *curves* or they can also be made in Nuke with *color correct* or *grade* nodes. A combination of both can also be useful.

The most complex DMP in this project has been the same as the one with the hardest rotoscope job, the *uphill* shot. This matte painting was created purely in Photoshop combining a series of different images from various sources, all of them free of rights.



Fig. 67 Image assets for the DMP



Fig. 68 Temple for the DMP and clean plate

The first aspect to have in mind when starting a DMP is having clear what will the matte painting be and a precise idea of what the inspiration is. Putting image over image without knowing what your idea is will only make the process more time-consuming and frustrating. For me, it was extremely useful to start with a quick layout drawn in the same Photoshop file to make things easier when searching for the different layers.

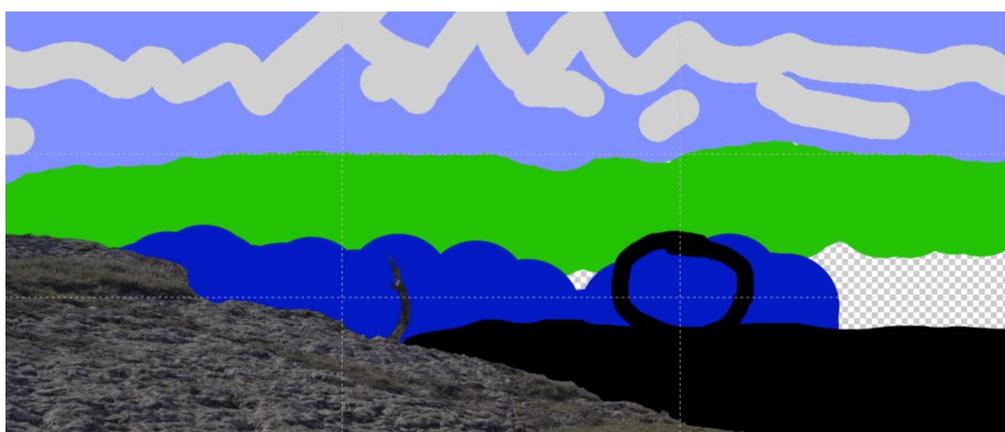


Fig. 69 DMP sketch with all layers drawn

One of the most important things when looking for images is that their lighting matches the original shot. As it can be seen in all images above that I have used in this DMP, all of them have the light coming from the left, the same as the plate. The light direction is very hard to manipulate and modify, unlike color, saturation or brightness of the image, so it must be taken into account seriously.

Once the idea was clear and the images for the layers are chosen, it was time to integrate them with one another. With the help of brushes of various levels of opacity, hue/saturation and other effects, the image should look like it is part of its background.

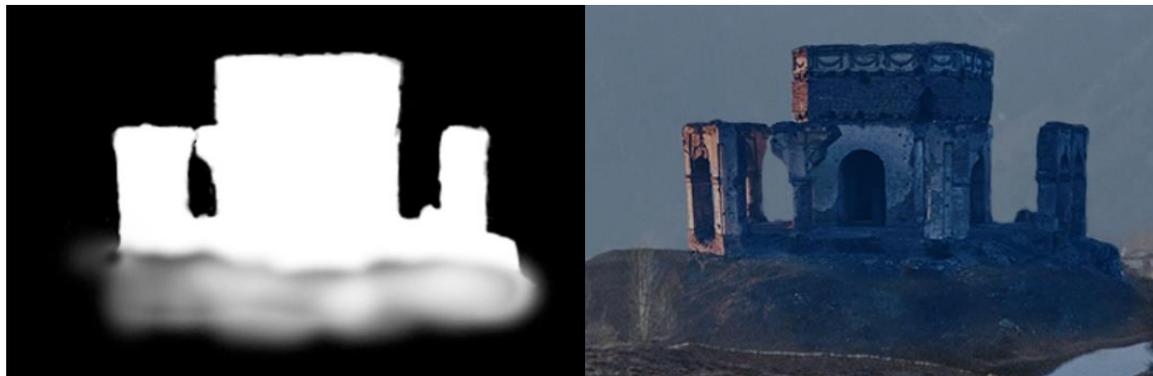


Fig. 70 Alpha channel of the brushes to integrate the temple on the background



Fig. 71 Channel mixer and hue/saturation effects added



Fig. 72 DMP without the effects to integrate the elements



Fig. 73 DMP with all effects added



Fig. 74 Final DMP

Once all layers were finished, it was time to integrate the DMP into the shot. Shadows and highlights can be created in Photoshop to enhance the lighting effect and give a more dramatic look to the shot.



Fig. 75 Final shot with the DMP integrated

As for the movement of the elements, I did a normal 2D tracking because the camera movement of the shot is very subtle and the rotation is not appreciated. I tracked the previous object that was in original plate, which in this case were the mountains in the background and I applied that movement onto the DMP.

Normally, this would be made using Nuke's cards, but the movement was so subtle that the easier approach worked well. Cards are 2D elements that are placed into Nuke's 3D space and, with the camera tracked, they move creating a natural parallax just like in the real world.

The other DMP that was hard to integrate was the one where the main character starts walking through a long bridge into the portal. The problem with this shot was the lighting, and it was tricky to get it right, as the main light was late in the day and coming from the right and the lighting from the photo was very diffuse.



Fig. 76 Original image for the Indonesian buildings



Fig. 77 Plate of the slow motion shot of the character walking

If the lighting of the photo to integrate would have been the same as the one in the shot, it would have been easier to adapt, but I really wanted to put this Indonesian temple into the project and that photo was the best perspective I found.

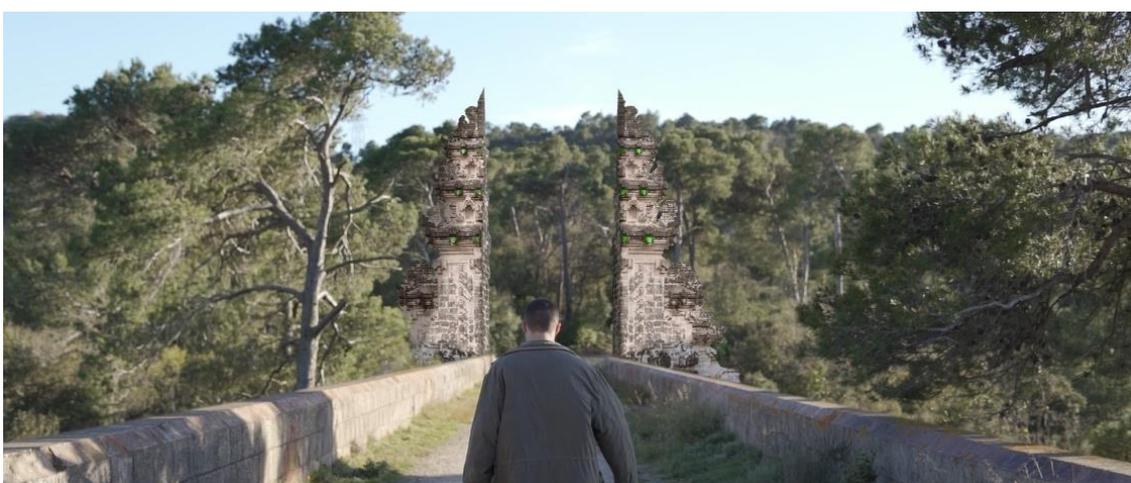


Fig. 78 First addition of the buildings on the shot with few corrections added

After some corrections in Photoshop and the addition of the green lights for aesthetic purposes, I created the masks and tracked the buildings with the same movement that they would have in their position. Due to the perspective, I did not use the left and right buildings in the original photo because it was a bit offset. Instead, I cut the right side one, which had the correct perspective for my shot, and then flipped it horizontally to create the left one.

However, these corrections were obviously not enough to integrate the images, as the color, light and focus is incorrect. With the help of grade and color correct nodes and the zdefocus node, I was able to finally get the lighting right and managed to have a good result. It was especially useful to modify the light and color levels comparing them to the actual lighting that occurs in the plate, so it gets the same amount of both and does not end up behind too dark or bright.



Fig. 79 Final modifications to the buildings

I also applied a lightwrap to the building and to the character. It is a tool that makes the object have its surrounding parts contaminated by the light behind it and contributes to the realism in the image.



Fig. 80 Lightwrap added to the protagonist's head

3D

As explained in the [State of the Art](#) and in the [Methodology](#), the 3D part of the project has been carried out in HoudiniFX. However, Nuke has also played a big part in this process, as before jumping into the main 3D software, I tracked the cameras of all shots that needed 3D implementation and exported them one by one as .FBX format. Once I had this information solved and the camera was imported into Houdini, I was able to get started on the shot.

Although this project was focused on the Nuke and compositing side of the visual effects workflow and I could have gotten the 3D assets from the internet, I decided to do everything myself. I felt like as this was my biggest project up to date, I wanted to make it only mine and push myself to do all the work needed. However, this meant that I had to adapt the 3D part of the TFG to my standards and to the time that I had at my disposal. I am not a 3D specialist by any means, so I knew that creating unrealistic expectations and trying to do something that was out of my reach would use too much time and the result would not have been satisfactory.

There have been two main 3D projects in this TFG, and they were similarly produced. As with the DMP process, in 3D, it is important to have a clear idea of which result you want to obtain. Modelling and visual effects software such as Houdini or Autodesk Maya consume a lot of resources from the graphics card and processor and render times can be exceedingly long. This means that doing something that the artist does not see clearly can cost in a lot of wasted time for the project.

The first shot made was the one where the cross of the church disintegrates and fades away with the wind. The second asset created in 3D was the animated cube that appears in 3 shots and plays an important part in the trailer.

MODELLING

The 3D process starts with the creation of the object to animate. I tried to make the objects simple but preserving as much detail as possible. Moreover, to get a clear idea of where the final 3D will be placed, I had a frame of the shot on the other monitor to visualize the final layout.

In the cross object, I started with a simple square and went extruding the shape until the final form was created. A mountain modifier was also added to create a more organic shape with bumps.

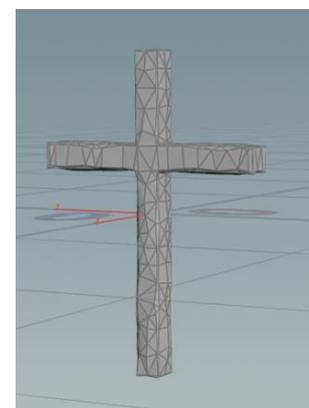


Fig. 81 3D model of the cross

The cube was created with a box element and I got the edges with a PolyWire node and extruded them to get the width necessary. I also added a mountain node here to make the cube feel like it is made from an inconsistent and old material. I played with the parameters of the elements and nodes in the cube until I got a result that I was satisfied with.

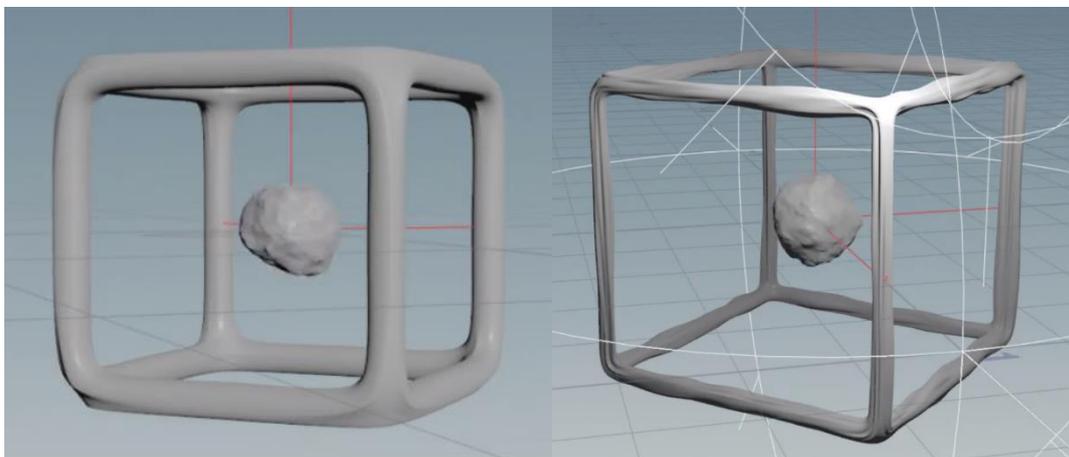


Fig. 82 First cube and modified cube

The *energy ball* in the middle of the cube is a sphere with a mountain node added to it so it would be able to be animated afterwards.

ANIMATION AND PARTICLES

The cube was easier to animate than the church cross. To make it look like it was some sort of *alive* and emitting energy, I animated the ball that is inside of it with the offset parameter of the mountain node with a $\$F*0.01$ expression. What this managed is that the ball would enter an infinite loop of offsetting itself and would look like it was constantly changing every frame ($\$F$). I multiplied it by 0.01 because the scale of the cube was small, and the offset would be too big if not done like this.

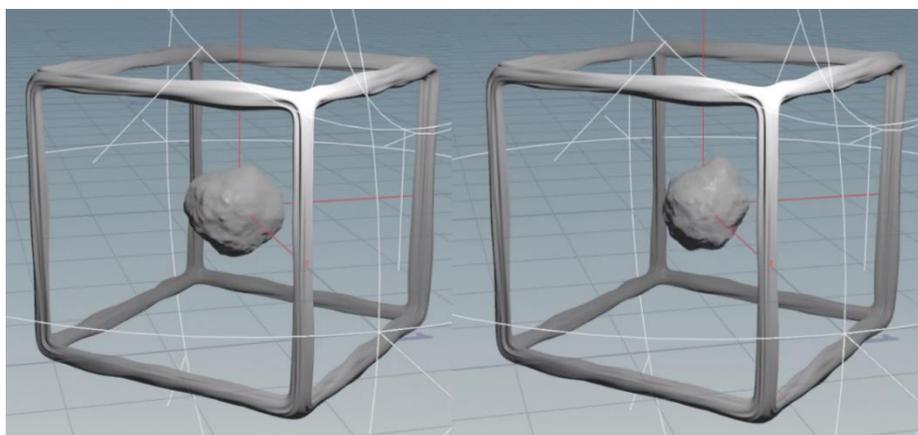


Fig. 83 Animation of the center ball of the cube

The cross, however, was trickier to animate, as the animation of the particles was the most important part of the shot. The disintegration was created using boolean operations and the particle emitters that Houdini offers.

I placed an extruded rectangle, bigger than the 3D cross, behind the main object and animated it so it moved ahead until it covered the whole cross. I made the boolean operation of the contact between the rectangle with the cross to be the particles emitter and when the cross entered inside it, it disappeared.

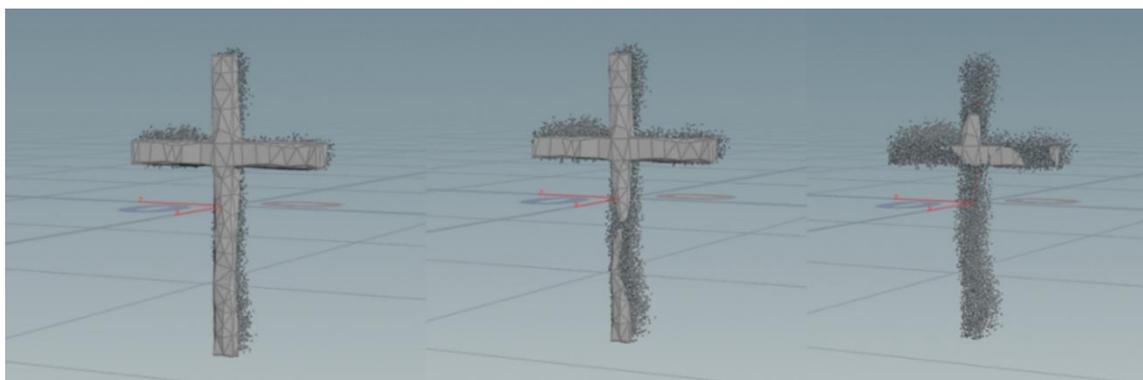


Fig. 84 Particles animation of the cross

It is basically an operation of $A - B$ where A is the cross and B is the rectangle, but the key of the animation was making the contact plane between both, the particle emitter. As the rectangle was invisible, it looked like the cross was vanishing into dust.

Inside the particle operator of Houdini, I modified the parameters of the particles such as the size, the weight and the life duration to get a good *vanishing into the wind* effect. Moreover, effects and forces such as wind force, axis force and negative gravity were added to make the disintegration much more natural and physically correct.



Fig. 85 Render of the cross disintegrating

TEXTURES, LIGHTING AND RENDER

The textures of the objects I made were created in the material operator that Houdini offers, although, ideally, they would be better made in a specialized software such as Substance. In order to create realistic textures, the first thing to do is examine the plate and get information about the materials that surround the 3D object and decide what material the cube or the cross are made of.

Once decided, I downloaded high quality texture maps from the internet and applied them in different channels: the diffuse color, the reflection map, the roughness and the height map.

The first idea I had with the cross was making it black so it would stand out from the rest of the church and it would draw attention easier. It was a good idea and the texture worked well, but finally I decided to drop it because I wanted to keep the realism at the maximum and this was not realistic at all, at least in my eyes.



Fig. 86 First render of the cross



Fig. 87 Render added onto the plate



Fig. 88 Final shot with all modifications added onto the cross

The cube was different than the cross, as I had to divide it into two parts. The outside part of the cube was a black mapped texture that resembled an old material that had been modified with time. However, the sphere had an emissive material that created the green lighting that can be seen reflected into the inside part of the cube.

Getting the green light to work and maintaining the rough texture of the ball was the hardest part. If I put too much light the details were not going to be appreciated and if the light levels were too low, the cube would not be illuminated, so I had to find the middle point.

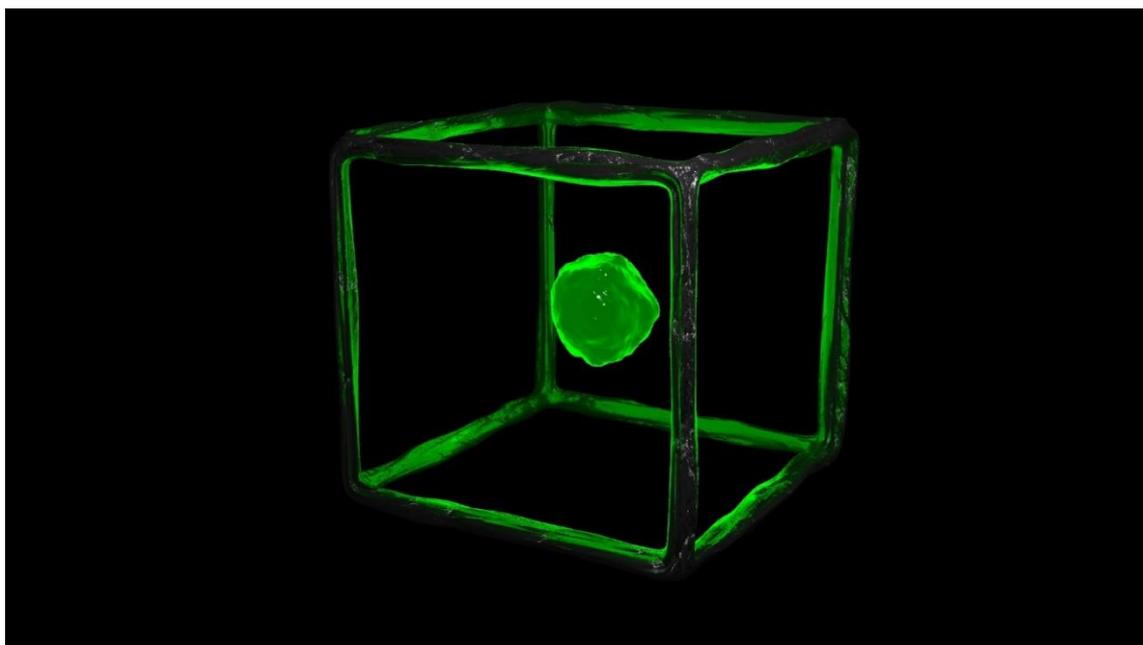


Fig. 89 High quality render of the cube with the textures visible

The lighting of the scene is the first step to start thinking about Nuke again. When rendering an object, it is crucial to know where it will be implemented afterwards. This is the same case as the DMP problem, images with different lighting to the plate will be incredibly hard to integrate. In order not to find this inconvenient, I placed a static frame of the original shot as the background of the rendered camera. As the camera was literally the same one as the shot because it was tracked, exported and imported into Houdini, the object would be perfectly positioned and I could see if the lights in the scene were working or not.

In the cube scenes, I the tree I recorded had the inside part in complete shadow, which meant that the light should be diffuse and not have hard shadows. When the intensity is bigger, the shadows need to be more pronounced and it is substantially harder to integrate later. In this image can be seen that the light is diffuse and is coming from the back.



Fig. 90 Plate where the cube will be placed

The direction of the light is the main parameter to look for and was what I spent most of the time in the church cross shot. I analyzed carefully where the light was coming from and how it affected into the church and tried to replicate it into the render.

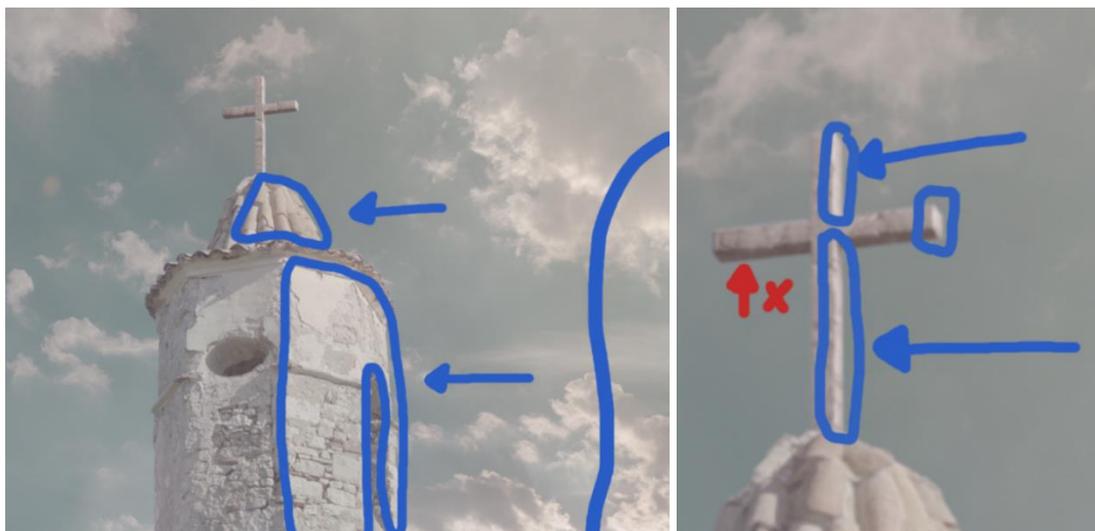


Fig. 91 Light direction sketch

As it was originally a clear day, the church was very illuminated by all sides, but the main sunlight was coming from the right. This meant that multiple light sources would be necessary for the render. I placed the main light as the sun to the right of the cross and placed a low intensity ambient light in order to make the shadows not be full black, as they are not in the church.

The shadows of the render were mainly the lower part of the cross because the sun illuminates just the upper side. This is indicated in red in the right image.

Finally, the third light I put was a very diffuse light at the front that illuminated the parts of the cross that were not the highlights nor the shadows. When the result is considered correct, it was time to start the render.

I rendered both objects with the mantra renderer, which is the one that comes as default in Houdini. It is a CPU-based renderer and, sadly, it does not excel for its quick render times. When starting a render, I made sure a few times that everything was correct and that nothing would need to be changed, because repeating the render would cause a big impact in the deadlines that I previously scheduled for myself. Luckily, rendering frame by frame allows the user to see the first image and check if every aspect of the scene is correct.

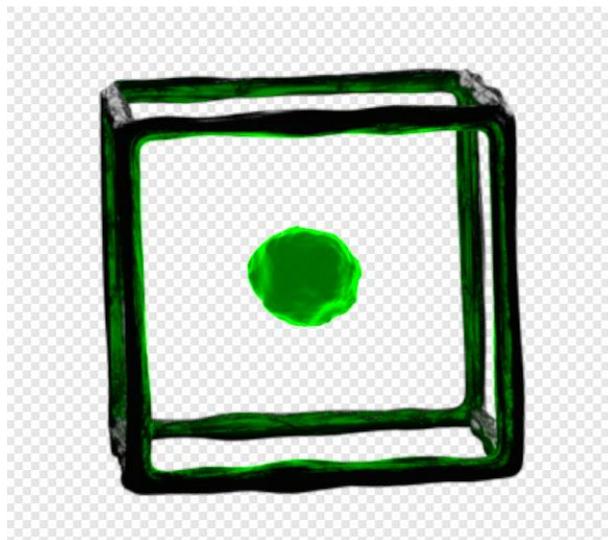


Fig. 92 Render of the cube with the tracking applied

Why Mantra? The reason I chose Mantra was purely for convenience. It is the render engine that comes with Houdini itself and the renders I needed were not too complex, so it did the job perfectly well. Moreover, I knew the engine thanks to the VFX optional subject that I coursed in 4th year of the degree, so it was easier for me to create the renders.

When the render is finally done, as it has the camera movement of the original shot, it can be directly imported into Nuke to integrate it correctly in the compositing phase.

COMPOSITING

Except for the 3D section, most areas already mentioned such as roto, cleanup and DMP integration can be considered as compositing work. However, I wanted to make a specific section for compositing to show how much detail and features the job has.

3D INTEGRATION

3D integration is one of the essential aspects of compositing. Although 3D artists and render specialists can do extremely well-done pieces of work, they need to be composited into the 2D shot. In this project, the compositing work to integrate the two 3D objects I modelled was fun and the result has been very satisfactory.

The church cross shot was changed drastically since the render came out, as I changed the color of the texture of the cross from black to the same color the church had in order to be more realistic. I also applied a small defocus and edge blur to make it look like it was a part of the church.

However, the integration of the cube was the one that took the most time. This is mainly due to the lighting that I wanted to simulate as if it was coming from the actual cube. The first thing I had to do to incorporate the cube into the shot was placing it where it should be. The render got the position right due to the camera track, but there were shots where some elements were supposed to be in front of the cube, so I had to roto them in order to put the cube behind them.

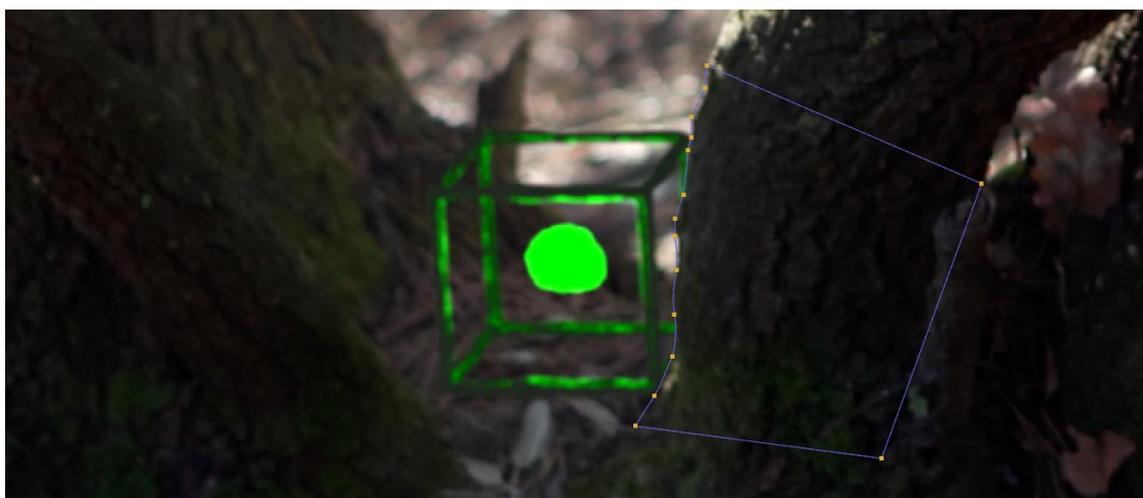


Fig. 93 Roto of the tree to put the cube behind it

Once I got the positioning out of the way, I recreated the contact shadows that every object creates when sitting on top of a surface. This little shadow adds a lot of realism to the scene and it would look odd without it. The way I did this was making a roto under the cube and adding a color correct node with the mask as the roto and bringing the

light levels down until it looked right. The difference may be little, but detail is key, and realism is achieved by the little things that make it look natural.

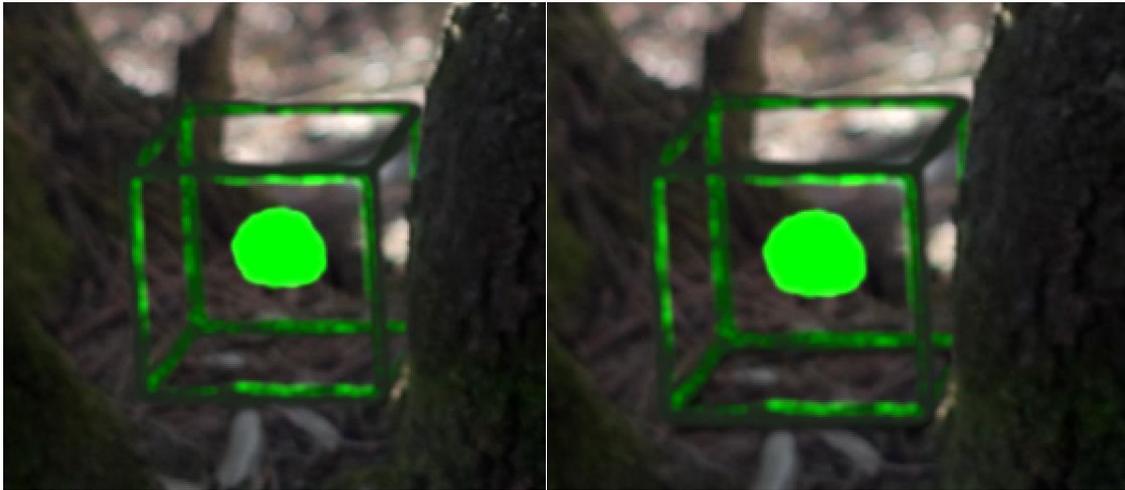


Fig. 94 Left: cube with no contact shadows, right: cube with contact shadows

In order to achieve the light emission effect, I did a roto into every element that would be illuminated by the cube and tracked it the best way possible, either by planar track, 2D trackers or even manually. These rotos connected to the mask input of a color correct node are the base of the lights effect. With this node, I enhanced the gain levels of the shadows and midtones of the image, added contrast and saturated the selected parts with the green color. I tried to get the color green as close to the one of the cube, so it would look as it was light coming from the ball.

In the image you can see the multiple rotos. What surrounds them with discontinuous lines is the feather for each mask. This feather allows the mask to fade and not end abruptly in one straight line. This has helped a ton, as with this feature, the light looks like it fades slowly at the end of the roto. I also used a glow node to enhance the lighting for it to look much more intense and powerful.

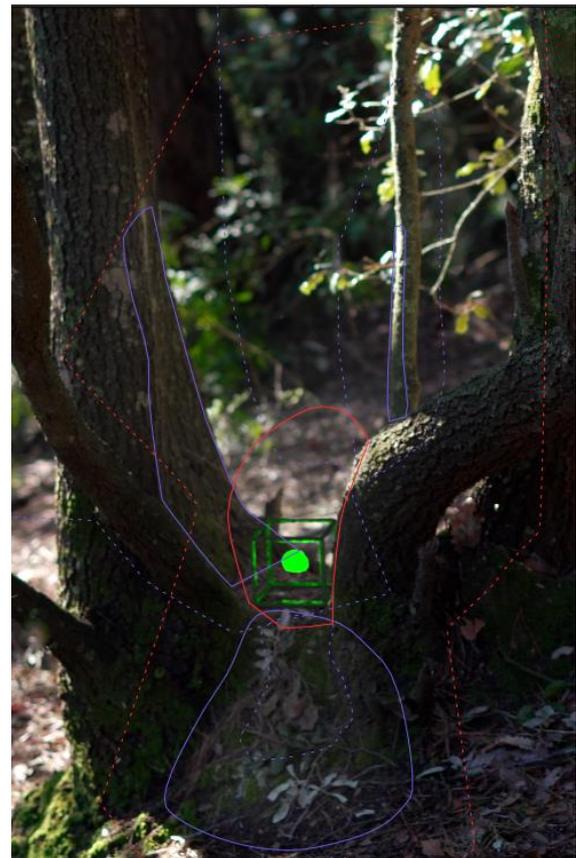


Fig. 95 Roto shapes with the feather shape over it (continuous line / not continuous line)

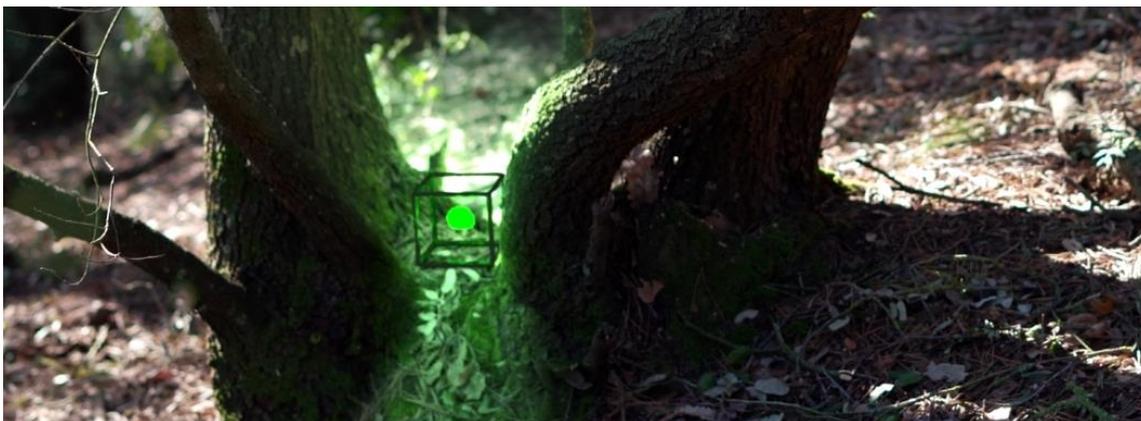


Fig. 96 Finished shot with the cube lighted up

Nuke has an enormously powerful feature with the node copy and paste, as the user is available to pass nodes with saved parameters from one file to another just copying and pasting onto the other node graph. All of this is possible because it just copies a text file that has the information of which node it is and its parameters. Moreover, the ability to pass information so easily allows Nuke scripts to be very manageable in large production teams.

As all three shots that involved the cube were in the same location with the same effects, I could repeat this exact same process to create the other shots and I was able to get the color correct node that had the information of the lights to the other scripts. However, all rotos, contact shadows and positioning masks had to be drawn and tracked all over again.

The most complicated cube shot was the one that started with a big defocus due to coming from the back of the tree. I really liked the transition of going from full black to coming out of the tree. However, the defocus that the camera did was enormous, and the cube had to be integrated into that with its lights.

It was hard to get the movement that the 3D model should have when the camera was completely defocused, as the tracker does not work if there are not precise points to follow. This meant that I had to manually track the movement of the cube the frames before the camera focused properly. When having done that, I applied a zdefocus node with high levels of defocus to make the cube look like it was there was not in the camera focus. Looking at the bokeh of the camera, I replicated the same one into the node parameters and selected a bladed bokeh with 8 sides, the same as the Alpha 7 III.

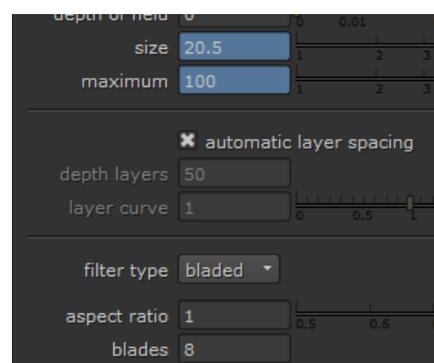


Fig. 97 ZDefocus node parameters

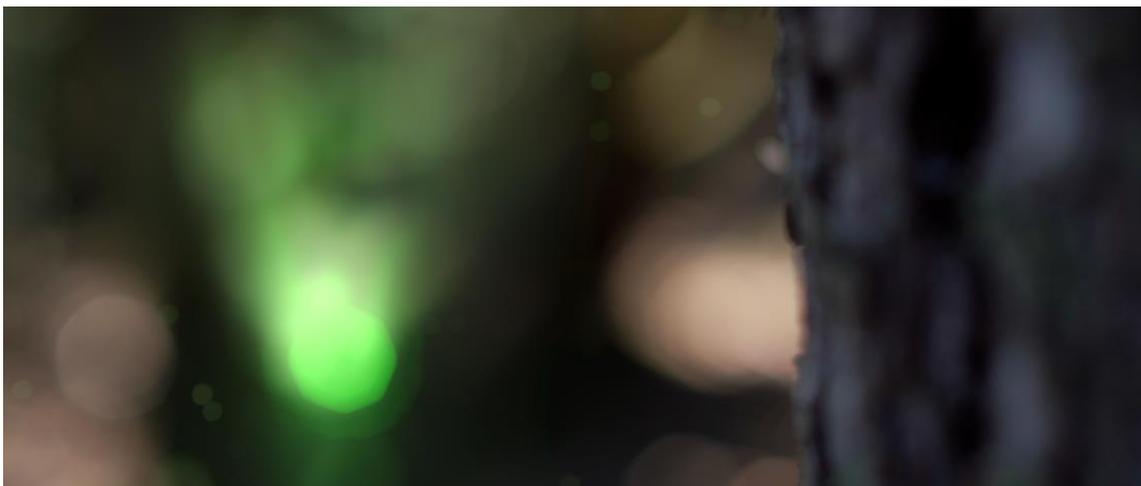


Fig. 98 Cube integrated with the out-of-focus shot

The last thing to do was roto the tree that provided the transition, so the cube was not in front of it. I also made sure that the tree got its left side illuminated when the cube appeared.

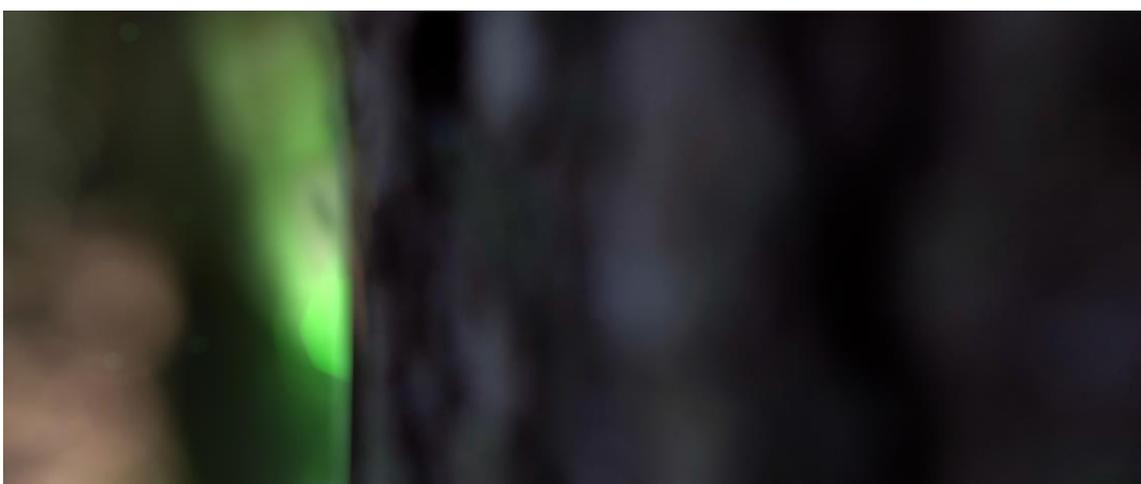


Fig. 99 Light from the cube coming behind the tree

2D INTEGRATION

In the 2D integration section of the project, I will explain everything related to 2D compositing that has taken part in this TFG, starting with a small example of what 2D postproduction is about. This part is the one that I have inverted the most time in because I wanted to focus the project into compositing, and it is what I liked the most.

One of my favorite things I have done in this project is one that may even go unnoticed by most people, but it is important for the continuity of the trailer.

Glasses in general, but especially sunglasses, are very tricky to film because they are very reflective and will show whatever is in front of them. Back in the storyboard period of the TFG, when I proposed to create a shot involving sunglasses to my tutor, he warned me that glasses were very hard to record and that I would probably need to replace the content inside of them in the compositing phase. I accepted the challenge and exactly what he warned me about, happened.

It is important to remark that all three of the shots in the finished sequence below were shot in different locations, so I had to edit them together to look like they were all in one scene.

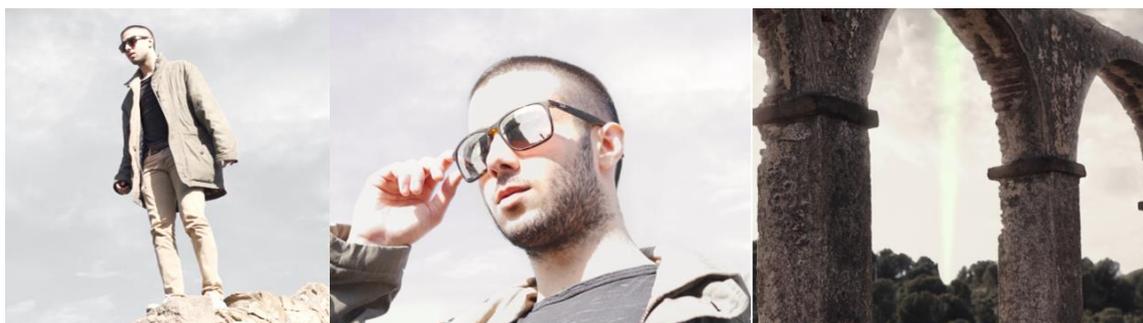


Fig. 100 Sequence of the three shots that were filmed separately

As the character was looking at the light from the forest through those arches, the logical thing was that the sunglasses should reflect is the scene itself. However, as the location of filming was completely different from one shot to another, the reflection of the glasses was incorrect. Not only was it incorrect, but it was also unattractive, as I filmed this shot in the rooftop terrace of a building and it made no sense to leave it like this.

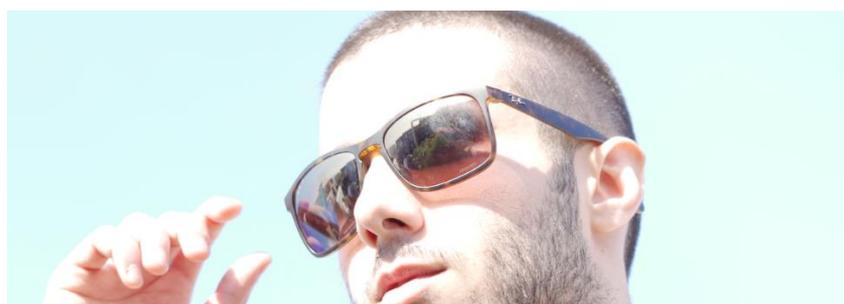


Fig. 101 Plate of the shot of the character taking out his glasses

I started with the roto of the sunglasses. I did the most stable part a planar track and then manually, as the tracking does not like fast movements.



Fig. 102 Roto shape of the glasses with the tracking applied

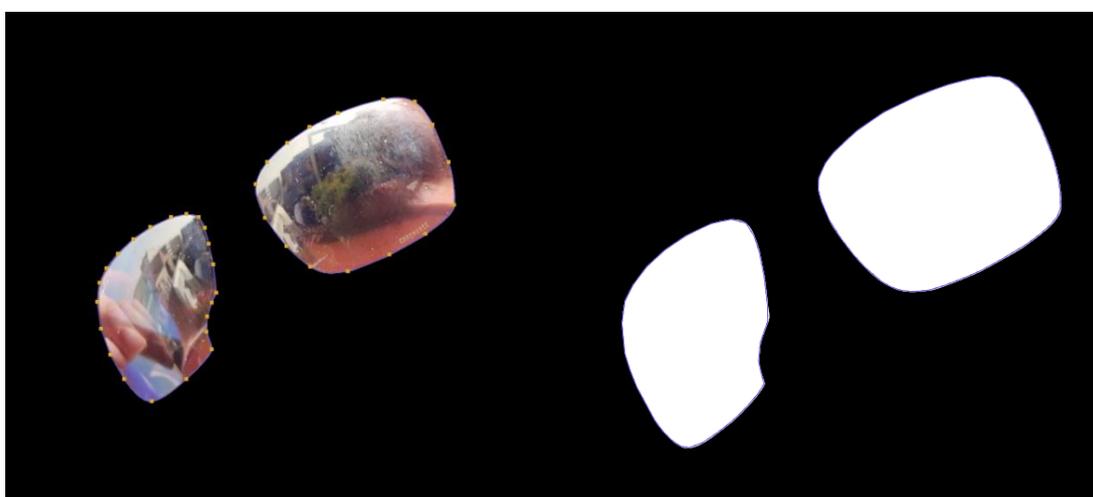


Fig. 103 Left: premultiplied roto, right: alpha channel of the glasses

When I had the whole movement and the alpha of the inside part of the sunglasses, I could start integrating the shot into them.

As he was supposed to be seeing the shot with the arches, I got a frame from that shot and used it as an asset for this one. Like in the graphic of the female character explained later in this section, I applied a GridWarp to distort the image and get the deformation that sunglasses often have. I also flipped the image with a mirror node because the reflected image is always mirrored to the reality. Moreover, details such as a zdefocus to blur it out a bit due to the depth of field of the camera and edge blur nodes were added.

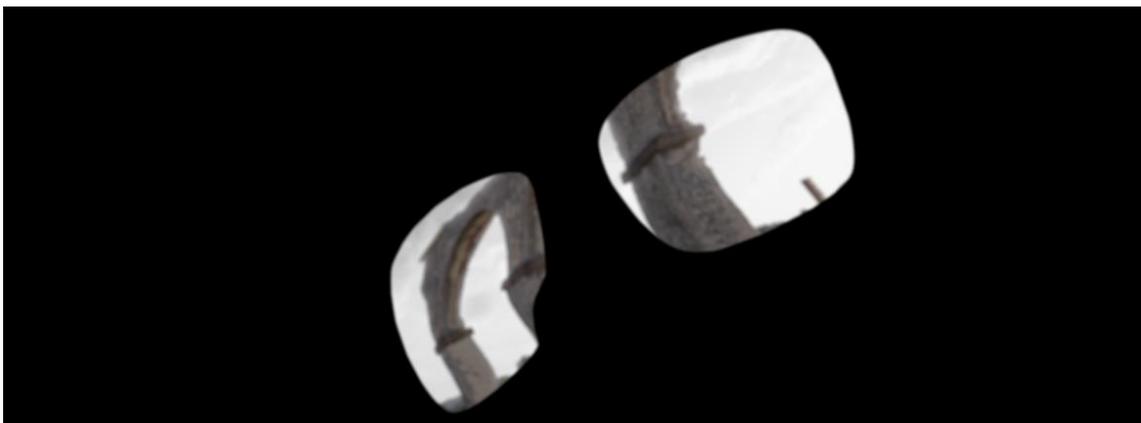


Fig. 104 Arches shot integrated into the shape of the glasses

However, the image above would look super unrealistic if put inside of the sunglasses, as there are no reflections at all and looks bland. To deal with this problem, instead of merging this asset with an *over* blend mode, which is the standard one, I merged it using a *hypot* blend mode. This operation added the darkest parts of the fictional glasses into the real ones and kept the highlights and reflections, which was exactly what I was searching for.

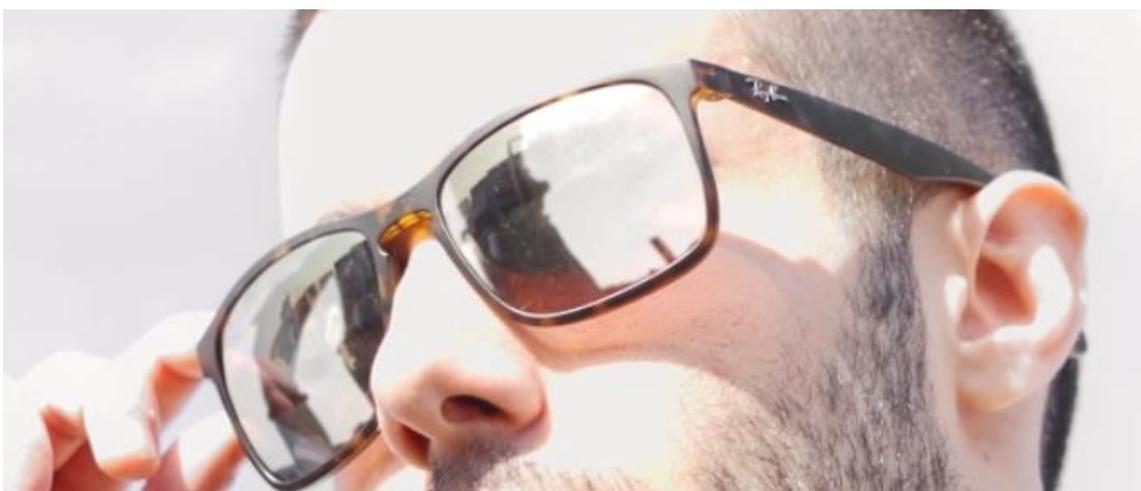


Fig. 105 Final shot with the new glasses properly merged

EYES REPLACEMENT

The most important 2D integration in this project has been the eyes of the characters in the trailer.

Both character's fictional eyes have played a huge part in the development and the abstract story of the trailer. The initial concept was clear: I wanted my characters to have eyes full of light and texture that expressed their energy.

I started researching for photos and ideas of mystical and fantastic eyes and found the references I needed. What I initially wanted was something like the Night King's eyes from Game of Thrones, with the blue eyes and black iris. However, when I saw other references, I thought that it would be a great idea to make the eye as the full texture instead of modifying a human looking eye. This would make them look more fantasy-looking and would give the characters more personality.



Fig. 106 References for the eye replacement process

Given that the cube was in a forest and the female character portrayed the cube guardian that was also in the same location, I thought that the best concept would be to apply the texture of branches and trees.

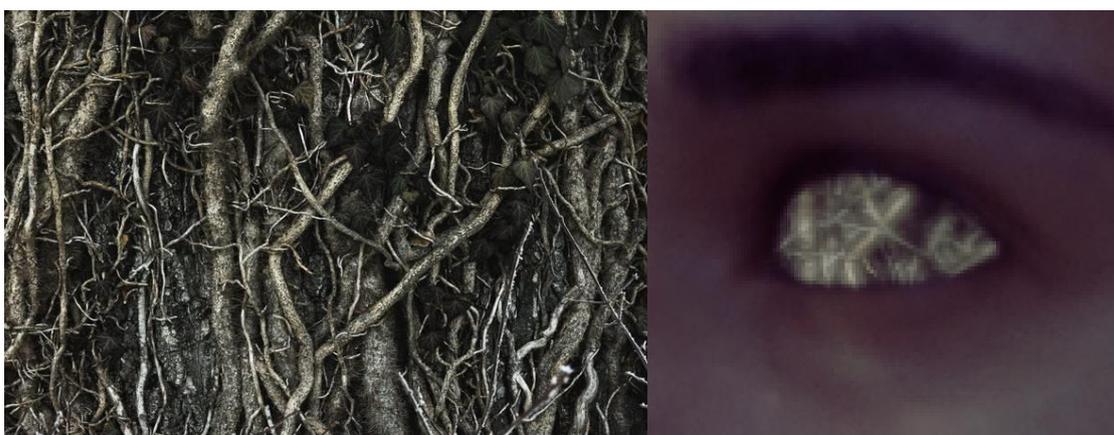


Fig. 107 Texture image with no effects

The first thing I did in the shots that needed replacement for the eyes was the animated roto. I tried to do it as precise as possible, as I knew that the eyes would attract a lot of

attention and they needed to be errorless. I found that it was better to make the roto slightly smaller than the eye itself, as the feather would cover a bit the edge and would extend it by a few pixels.



Fig. 108 Roto tracking of the eye

I used a merge node with the *in* blend mode to put the image inside of the eye. This mode was useful because it created a black shadow around the edges and made the image look like it was actually inside of the eye. I perfected this shadow with an edge blur mode.



Fig. 109 Texture applied in the eye with no effects

To modify the aspect of the eye and give it more energy and color, I used two nodes, the color correct and glow. Most of these nodes are used a lot of times throughout the whole project, as they are essential in the Nuke compositing workflow. I gave the eyes a high intensity green color with glowing light so they stood out as much as they could with the exception of the last shot of the main character, where his eyes are completely desaturated due to the loss of energy and the cube shutting down.

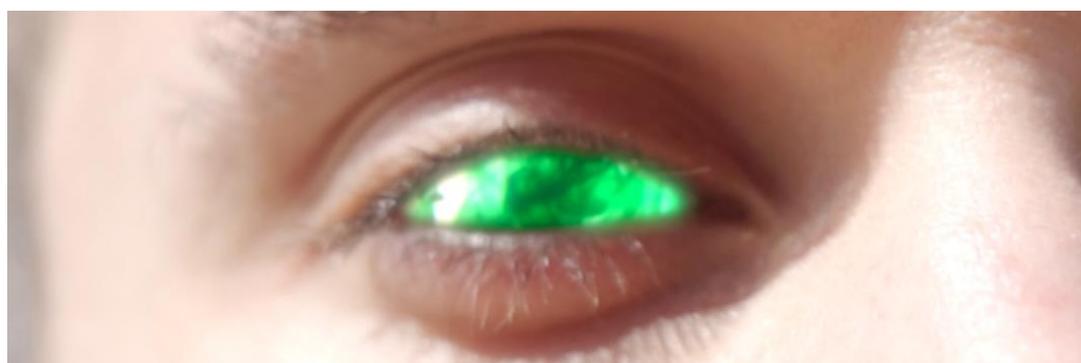


Fig. 110 Effects added into the composition



Fig. 111 Final shot of the eyes of the female character

In this shot of the female character, I added green lighting around her eyes to make for a more mystical and fantastic look.

The image to integrate into the eyes also needs to be tracked, not only the mask. If it is not tracked, the image would just stay static and would not move with the motion of the eyes. There have been two ways of proceeding with the tracking of the image from this point onwards: planar tracking it or using SmartVector and VectorDistort.

The first option is the easier one and it is focused to be used in the shots where the characters do not move their head or move it very little with no rotation at all. If the character's head rotated, I had to go with the second procedure. Both shots of the girl and the last shot of the main character had to be carried out using SmartVector and VectorDistort.

SMARTVECTOR AND VECTORDISTORT

SmartVector is an enormously powerful and advanced tool that NukeX offers. This node examines the whole .EXR sequence and analyzes the motion vectors in every frame. These vectors describe how every part of the shot is moving or rotating and separates the different motions by zones.

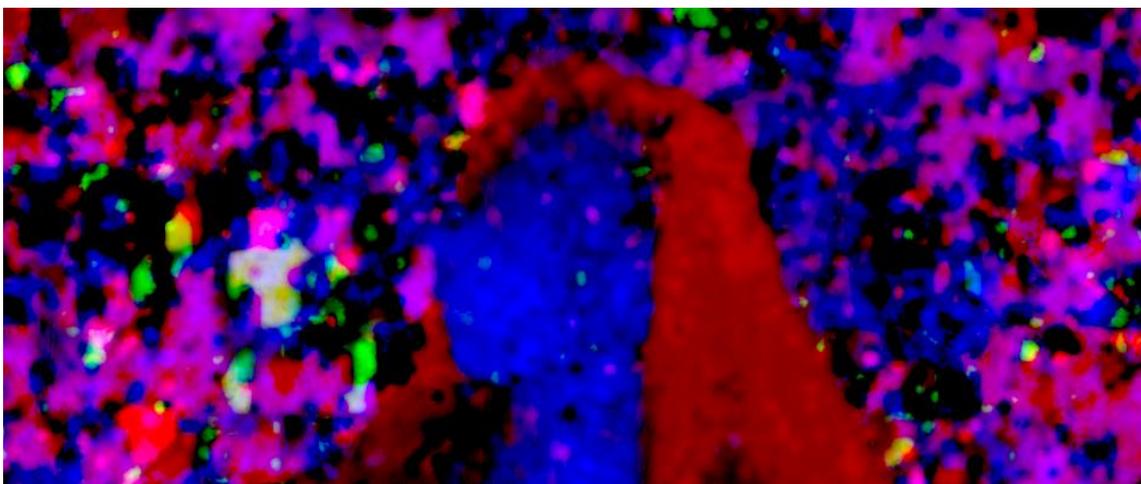


Fig. 112 Visualization of the vectors from SmartVector

In the image above we can see that the node separated the head from the veil and those two elements were also separated from the background, which logically had a completely different movement to the head.

The reason why I said it was such a powerful tool is because of the toolset that comes with it. The VectorDistort node is one of the most important tools in relation to SmartVector. This node distorts and moves everything that is placed in the image in relation to the vectors that were analyzed previously. This means that, if I placed an image on the upper right corner of the shot where there is only information from the background, the image would have the movement and distortion of the back of the plate. However, if I place something on top of the face of the character, which is what I did with the image in the eyes, VectorDistort will move and deform it with the shape of her face. This was particularly useful to recreate the rounded shape of the human eye, as the integrated image had to be slightly distorted around both ends of the eye.

I also used this toolset to create the animated runes that appear in the girl's skin when looking to the left of the shot.



Fig. 113 Final shot with all effects applied

I found SmartVector and VectorDistort hard to work with at first, but when I started to play more and learn how to use it, I saw that it was incredibly precise with the correct settings applied to the nodes.

The graphic that appears on the cheek of the character is a static image animated to look like it has special codes and magic runes rotating inside. I placed two of the same images on top of each other and masked the outside part of one and rotated the inside of that one. This way, I made it look like there were two parts of the graphic, the outside and the inside and that they were independent from each other.



Fig. 114 Runes graphic

Although VectorDistort is precise, almost every automatic process needs to be retouched and perfected later. Thanks to the feedback from my tutor, I detected that the shape of the circular graphic was not adapting very well to the shape of the cheek of the girl. It was a detail, but it was much better integrated when I applied a GridWarp node to deform it with the same shape of the face. I masked the lower right part of the runes to make them slightly darker, as her face is less bright in that area as light does not illuminate it the same way.



Fig. 115 Shot without GridWarp



Fig. 116 Shot with GridWarp added

As with the other assets integrated, I applied some color correct and glow nodes to make the .PNG look like it was glowing in the dark. I also animated the entry of the asset in an organic way where it starts to form from different points of the graphic.

SMOKE, PARTICLES AND VOLUMETRIC LIGHTS

Sometimes, library assets such as smoke or dust particles can make a shot go from standard to looking more cinematic. These resources, however, need to be applied in a very subtle way in order not to make the shot too loaded and crowded.

Although these visual effects can be generated in 3D software as explained earlier in the Houdini section, there is also footage of particles or smoke recorded in high quality with a black background around the internet. These effects are known as library assets and can be integrated in Nuke without having to jump into a procedural 3D and VFX program. I have downloaded most of them from mitchmartinez.com. He is a director of photography that allows creators to use freely all the footage he recorded in 4k under royalty free conditions. There is a wide variety of assets in there to download, from smoke and particles to fire and water.



Fig. 117 Particles footage with no retouches

To integrate the resources into the shot, we need to figure out what we want the asset for and where it will be positioned. Most of the time, these particles are used to create ambient in the shot, so they must be applied carefully and merging them with low opacity settings in order for them not to get too much attention from the viewer, as they are purely complementary.

Library assets are much easier to integrate than creating the visual effects in a 3D software. However, they still need to be modified and composited into the shot properly and cannot be straight up merged into the plate. In most of these integrations, I have color corrected the particles, focused or defocused them and masked only the parts that I wanted from the footage with a high feather.



Fig. 118 Particles added with incorrect integration



Fig. 119 Particles added with correct integration

These assets are recorded with the black background so it easier to integrate them with a *screen* or *plus* blend mode that the merge node offers. These mathematical operations get just the highlights of the footage that is being integrated and ignores, in this case, the background.

One of the few shots that these library assets were not applied for aesthetic purposes was the portal one. I wanted to create a smokey portal between the two Indonesian constructions, so the main character looked like was walking towards it.



Fig. 120 Color correction of the smoke footage

The Kronos tool was also of great use when integrating smoke. Usually, the smoke that I needed had to be in slow-motion, but the assets were not. This node allows to slow down footage a lot and interpolates particularly well resources such as smoke and dust particles. Nodes like *retime* did the interpolation worse than *Kronos* because it made the slow-motion clunkier and not smooth at all.

Volumetric lights are also visual effects that complement a shot, but they are not library assets. These lights can be created in *Nuke* with a node called *VolumeRays*. This tool creates ray lighting effects that radiate from a specific point that the user indicates. If a source is connected to the *image* input of the node, the rays will be generated using that image instead.

The most important use of volumetric lights in this project was the shot of the lights that came out of the forest on the horizon.

The green ray is a volumetric light that is created from a small green circle and goes upwards. The green circle was created by simply connecting a radial node to a color correct and then merging it to a black background. All of this was then connected to the VolumeRays node and then modified the options and parameters until I was satisfied with the result.

The option *Use flickering* makes the ray have some noise and makes it more organic accordingly to the levels put in the parameters. However, I wanted it to be like a light that illuminated the sky and the clouds that were in its way. So, I added a smoke asset like the one explained before and merged it with a *multiply* blend mode. This operation is one of the most used as it is the opposite to *screen* or *plus* because it gets the darkest parts of the footage and discards the highlights. The smoke is video footage, which means that the green light will be animated and will look like it illuminates the dust and smoke in the air.

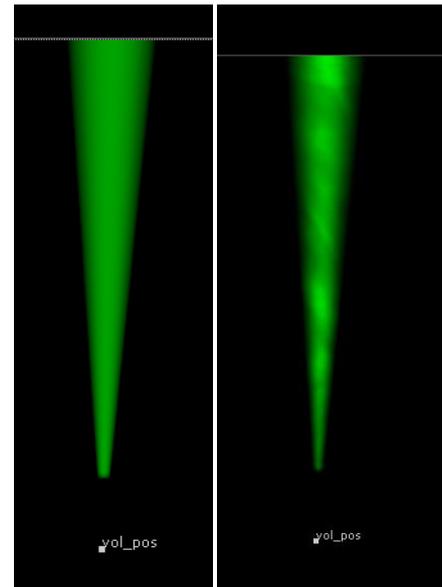


Fig. 121 Volumetric lighting without and with the smoke



Fig. 122 Volumetric lights added in the alpha



Fig. 123 Final composite of the shot with the sky replaced

TITLES

Titles may look like they are easy to produce but, as with many other things, there needs to be a clear idea in mind to know what the artist wants to create.

I feel like the titles of a trailer really convey the whole idea and inspiration of what the movie will be, so there needs to be a direct correlation between them and the imagery. In response to this, I searched for [references](#) to have a good creative direction.

Once I collected all the needed images, I jumped into Adobe Fonts to look for a suitable typography for the project titles. I used that platform because all font families from <https://fonts.adobe.com/fonts> can be used freely for any project and there is a huge variety of professional typographies. Firstly, I was considering using **IMPACT** for the titles, as it is a condensed and powerful font, but finally drop the idea temporarily because I wanted the titles to be more creative. Other options were **PARALUCENT BOLD** or **STENCIL**, but finally ended up using **MASON SERIF OT BOLD**, as I absolutely loved the design of the letter N and the overall look of the font suited very well the aesthetic of my trailer.

To make the titles more attractive and aesthetic, I did all the creative process in Adobe Photoshop. I added rusty textures as well as gradients and effects such as Hue/Saturation to make the letters have a more fantasy look.



Fig. 124 Photoshop lettering for the main title

I decided to make a creative decision that I think was necessary. In order to make clear the GENESIS was the title of the film, I added green touches to the lettering but left black and white all the other phrases and credits.



Fig. 125 Photoshop lettering for a secondary title

When I finished the lettering, it had to be composited in Nuke for the final touches. In the compositing phase, I wanted to apply a technique that I knew but never actually had the chance to implement. Normally, when we light an area in a dark environment, the

dust particles floating in the air in the middle of the beam of light are illuminated. I wanted to replicate this effect with a volumetric light and footage of particles, so I did. In this case, the volumetric lights came from a big rectangle in the right side of the shot and so, the particles in that area were lighted up and the others were barely visible.



Fig. 126 Subtle volumetric lighting with the particles illuminated

In this case, I color corrected the particles and used the flicker option for the volume rays to make it flash randomly through time. The last thing left to add was a texture similar to the one for the lettering but for the background because, otherwise, it was very bland and dull.



Fig. 127 Final GENESIS lettering

I had some problems with the alpha channel when importing to Premiere Pro, as it was getting imported very grey and not that dark, as I wanted it to. I discovered it was due to the alpha channel because I applied a black constant behind the shot, which did not matter visually at all because it was behind, but it covered the alpha channel and kept the light levels right throughout the remaining parts of the process.

I used the same process for all titles for creative consistency and to save time. However, I recovered the idea of using **IMPACT** as a font for the credits. I was happy with the typography I chose for the titles, but it was not going to work for the credits because it was too much text, too compact and the legibility of the font was not the best. In the credits I wrote the names of everyone who helped me with the trailer and put my personal logo in the lower part to give my project a more personal feel. To create the trailers, I researched and watched a lot of film trailers and saw that everyone was as compact as it could and tried to put every name possible on the list. Moreover, I liked the idea I saw of writing very close words but separating it with the letter weight and I put the names in bold and the roles in regular, as the names are what needs to stand out more.



Fig. 128 Credits of the trailer

COLOR GRADING

The color grading is the final part of the visual part of the project. As the main edit was already done in the [mock-up](#) phase with the storyboard images, I could focus on the color treatment that I would give to every shot of the TFG. All the color grading process has been carried out in Premiere Pro using tools such as predefined LUTs and Lumetri Color.

I divided the trailer into three main sequences: the ruins sequence, the forest and the main character's journey. I wanted every sequence to feel as their own, so I applied a different LUT for the three of them. I knew that I wanted to make the forest sequence saturated and full of life and the actor's journey had to be the contrary: desaturated and greyish. The ruins one I wanted to express that everything burned down and that there was nothing left there so the character needed to go find the cube.

The first sequence that appears in the trailer is the ruins one. What I wanted to achieve in this part of the trailer is the look of devastation that occurs when everything has been burned down and destroyed. I searched for references and thought that giving it a reddish look with high contrast would be the best option. Thanks to the sLog settings of the camera, I was able to recover a lot of information and had more options available with the color grading.



Fig. 129 Color grading for the first shot of the trailer

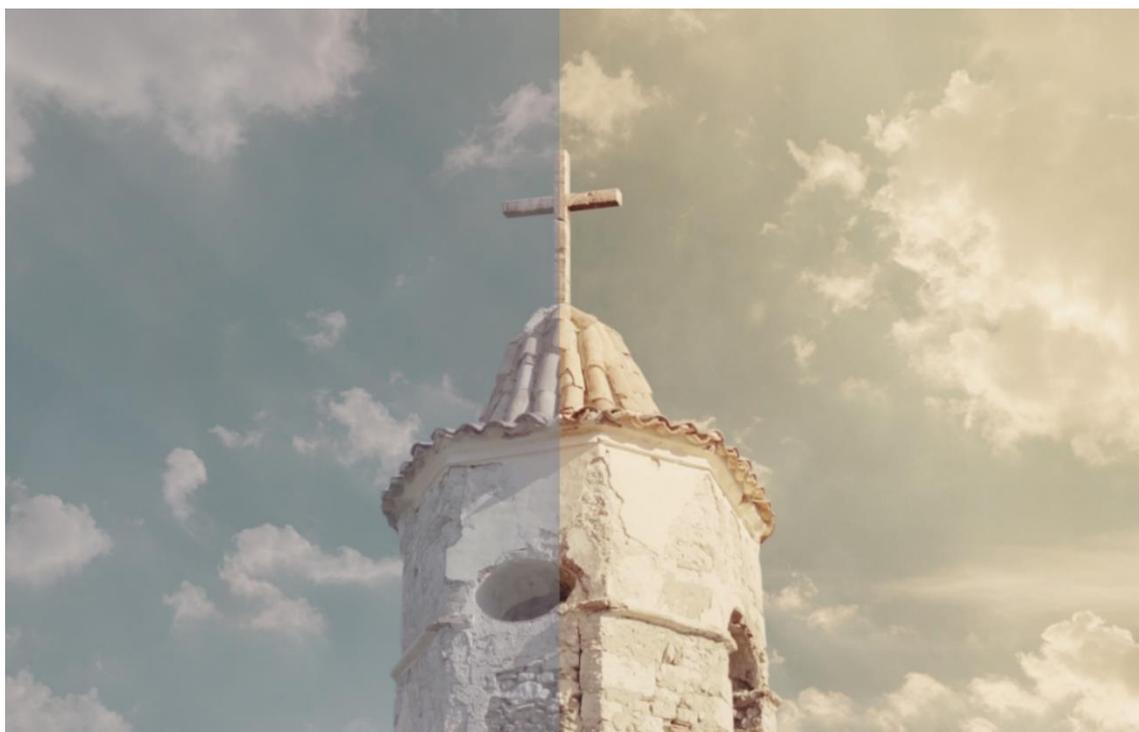


Fig. 130 LUT added to the shot of the church

I found it hard to visualize the final result with the color grading in the compositing phase. I wanted to create the composite maintaining as much information as possible to recover it later in Premiere Pro. However, I knew that if the assets and VFX were correctly integrated with the original colors in Nuke, there would be no problem changing the colors afterwards.

The scene of the main character's journey was also filmed partly in sLog and HLG. I wanted it to have a very greyish and desaturated color because of the parallelism and contrast with the forest scene. Aspects like the sky were replaced for a grey sky and every blue color in the image was taken out either by bringing the saturation to 0 or by changing its hue. Contrast was added because the sLog settings is too even in the grey levels and I wanted to level it with the original contrast that HLG applies. The only saturated color I wanted to have in this sequence was the green color, for continuity and narrative reasons.



Fig. 131 This LUT provides a reddish tint and contrast

As ruins also appeared in this shot, I wanted to apply a similar reddish tint to the other first ruins sequence.

There are two shots in this sequence that have been treated a bit differently to the others. In the main character's last shot, my objective was to make the character as lifeless as possible, as his energy had already faded away and the cube was about to shut down. In order to achieve this, I desaturated his face until his skin tone was greyer than orange and took out contrast because it made the image feel less alive.



Fig. 132 Color grading to make the character feel defeated

The other shot that was treated in a different way was the backlight one where the character starts to go mad. I was heavily inspired by the *Book of Eli* trailer for this project and I saw a shot that I wanted to replicate in some way in my TFG. I thought that the character expressing anger and madness throwing rocks and hitting the floor was an already impactful image and putting in a backlight shot would enhance it even more.



Fig. 133 Inspiration from The Book of Eli (2010)



Fig. 134 Color grading to create a backlight shot from an SLog2 file

The last scene that needed color grading was the forest sequence. This one consisted of the shots of the cube and the ones from the female protagonist. Every single one of these shots were recorded in the HLG settings of the camera, which means that the plates are already saturated and contrasted, and that I had less margin to modify the information. This was not a problem, as I planned to do it this way because I knew that this sequence would have lively colors.

The focus of the image had to be always on the cube, so, in the shots where the 3D model appeared, I maintained the green color of the sphere as the main point and the other greens in the image were translated into more of an orange and yellow color.



Fig. 135 LUT for the whole sequence of the cube

In this shot, the difference between the original plate and the one with the LUT applied, is not as big as the ones in the previous sequences. In the shots with the girl, however, I put the same LUT as this one but took a more creative route to emphasize the personality of the cube guardian.

In order to make the eyes the focal point of the shot, I enhanced the oranges in the background even more than in the shots of the cube. In my opinion, it gives the shot a more mystical and appealing look because the girl stands out more from the back part of the forest. The green of the eyes was untouched.



Fig. 136 Creative look applied to both shots of the cube guardian

AUDIO EDITING

When finished with the video part of the TFG, it was time to finally wrap it up with the editing of the audio.

To start this process, I recorded the voices myself with the help of my friend Pedro, who had a good microphone setup and helped me configure it to do a good voiceover impression. I put the sentences that I had to pronounce as text over the finished trailer, so I was able to record while the music was playing and knew the tempos correctly. Having to record the voiceover myself was hard because I never did anything like that before and did not really know what I had to do when pronouncing the sentences. Finally, I ended up trying to put a good narrating voice to make it sound as good as possible. I also made that I recorded at least three versions that I was satisfied with of each sentence because having to record them again would be too time consuming.



Fig. 137 Me, in the process of recording the voiceover



Fig. 138 Microphone and MacBook setup for the recording

When finished recording at my friend's apartment, I started with the voice transformation. I used the audio editing part of Premiere Pro for time saving purposes, but this procedure is better made in Adobe Audition. Sound modifiers such as pitch shifter, equalizers, reverb and dynamics processors were used to make my voice sound deeper and more guttural. Basically, I wanted my voice to not sound like it was me talking in the trailer. Many tests and modifications had to be made because either the voice was too loud in comparison for the music or it was too quiet, and viewers could

not comprehend properly what I was saying in the sentences. The reverb effect also affected the understanding, so I put it at minimal levels. I finally ended up putting the voice in a regular volume but lowering the music when I spoke.

The last set of elements to add in the Premiere project were the sound effects. At first, I was inclined not to put any audio effects, but after speaking with my tutor, I decided to put them in to create the soundscape of the trailer. These effects were added to the destruction of the church cross, the energy coming from the cube and the forest sounds.

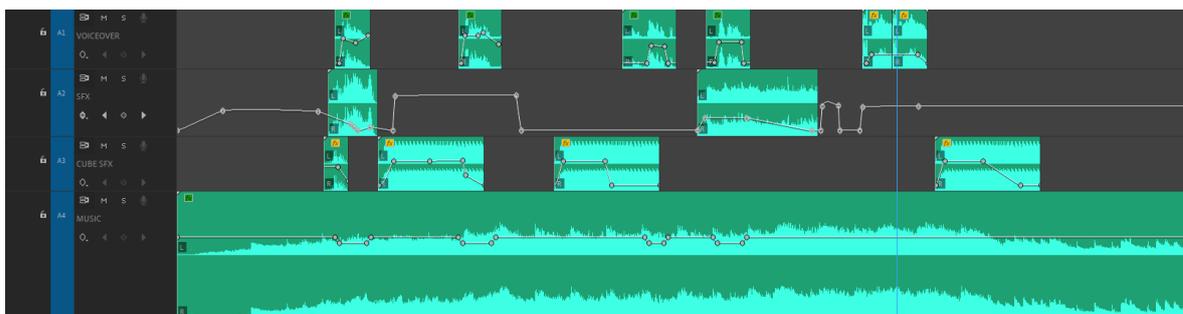


Fig. 139 Timeline with the audio in Premiere Pro

6. CONCLUSIONS

I always put high expectations on myself, and when I started thinking about this TFG, I knew it had to be my biggest project up to date and the flagship piece of work in my portfolio. It was clear to me that it would take a lot of hours of learning, researching and working, as I wanted to learn a whole new professional software such as The Foundry's Nuke while progressing with the main task.

At the same time, I wanted to do the whole project on my own. Although it is mainly focused on the compositing side, my major objective was doing all phases myself, from creating the 3D objects and not downloading them from the internet to recording the voices and managing the audio part myself. I am by no means a 3D expert nor had any experience with audio treatment and this may have put a lower ceiling on my project but, otherwise, I would not have felt that the project was truly mine.

When progressing with the project, I asked myself many times if my expectations were too high and was demanding too much with such an ambitious TFG. It was often frustrating because, as I was starting to learn Nuke, I was using too much time on tasks that I thought had to be made in much less, but things finally came out little by little.

During this project, I have learnt so much about compositing with Nuke and the immense world of options that the software provides, and I am eager to get started with new and bigger projects. The learning and researching are the most important things that I have gotten with this TFG and I think this will be extremely useful for me to make a step forward in my professional career.

As for the trailer itself, I am proud of the results and I think the hard work finally paid off. I managed to do everything that I initially planned and have done it with new techniques, focus on the realism of the scene and lots of creativity. There have been many ups and downs in relation to the TFG and motivating or frustrating phases, but in the end, it came together well. Moreover, if I had infinite time, I would have corrected it a million times, as projects like this are never perfect and can always be improved.

However, evaluating my own project is hard because I have seen it a thousand times, so if the trailer shows the hours of work behind or not, is up to what the viewer thinks of it.

I have tried to create a trailer that would normally be carried out by a group of experienced professionals, so it is unrealistic to compare it to a project of that caliber. On the other hand, considering the minimal resources I had, I think this is the best I could have done, which is something that I am extremely glad about.

Another thing I am proud of is the way I have organized myself with the time I had for the project. With tools like Shotgun or even the calendar, I always planned the timings with second options because I wanted to have everything under control. If a shot took me much more time than I thought it would, I reorganized myself and positioned everything again to end the project on time. Good organization also meant good project management, which meant taking care of having everything in its correct folder and saving copies daily, either in Google Drive or in an external disk. I am also grateful to own a computer that has been able to hold and carry out the project with huge files and demanding software and effects.

Finally, I want to thank the technical services of my university for letting me use their HoudiniFX license through a virtual machine and my TFG director, Francesc Macià, for helping me with any doubts and corrections throughout the whole process of creation. In addition, I would also want to thank my friends Paula and Max for offering themselves to appear in the trailer, Pedro and Jan for helping me with the filming and audio recording and Eva and my family for constructively criticizing the project and helping me through my ups and downs.

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