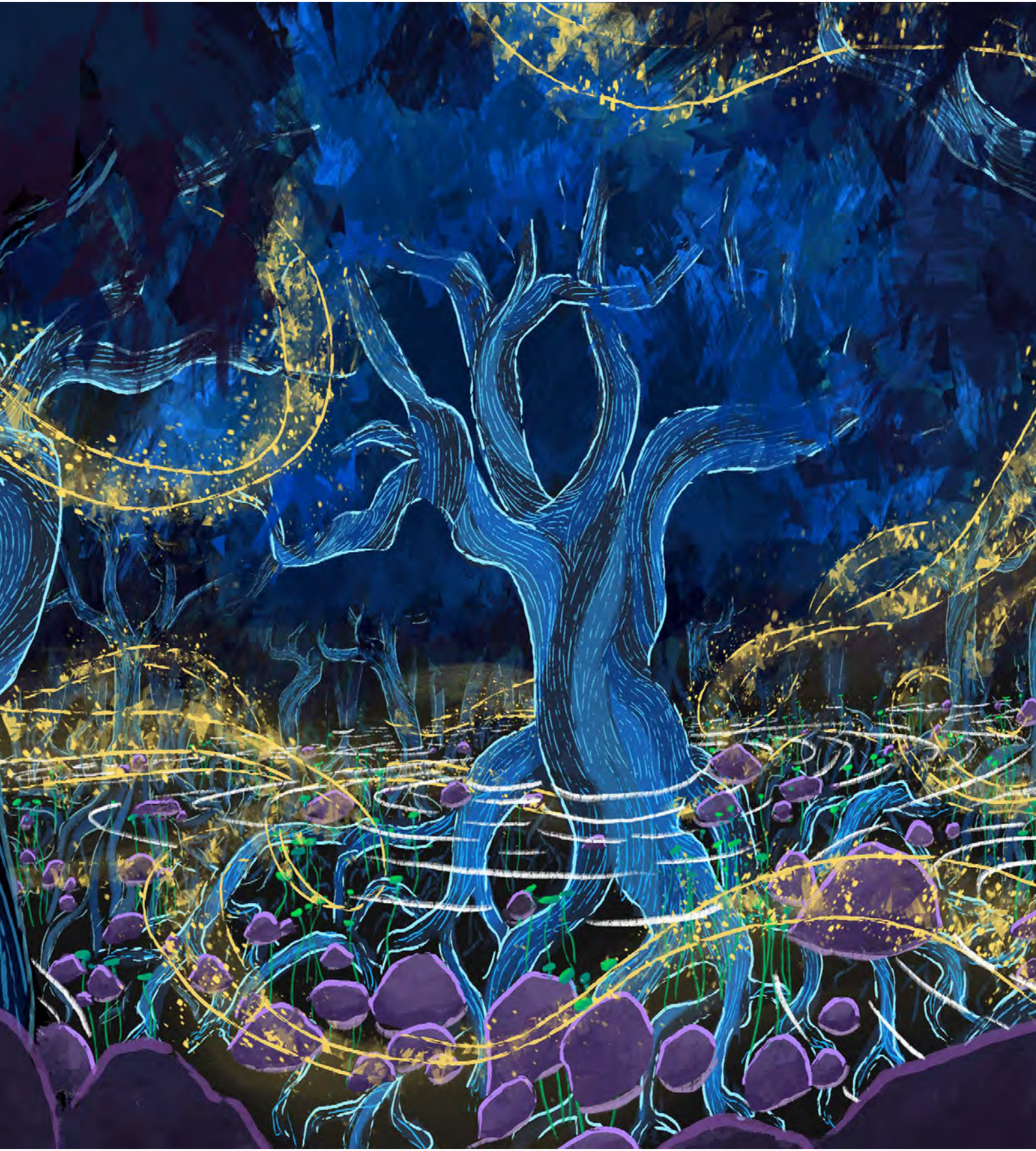


# FORESTS





While telling its story, the project, *Forests*, invites you to join in a discussion with trees to get to know them better and to take a new look at them, making you want to rediscover the forest, the organ that is essential to the survival of our planet.

The *Forests* project won the WOOD Writing Residency, held at Saint Quirin (France) and Baie Saint Paul (Canada) in September and December 2019.

It has received development funding from Pictonovo (Hauts de France Region) and Cinéforum (Switzerland).

It is co-produced by Zéro de Conduite (France), Nadasdy Film (Switzerland) and the Cognitive Sciences Research Lab SCALab.

It is also followed by Ernst Zürcher, Forestry researcher at the Swiss Federal Institute of Technology in Lausanne (EPFL) and the Bern University of Applied Sciences.

**Length:** 15 minutes

**2D/3D Animation**

**Authors:** Fabienne Giezendanner, Igor Carteret, Marcel Barelli, and Thomas Rouvillain.

**Target Audience:** 12 and up

**In development**



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## Synopsis

*Forests* is designed to be played as an LBE installation, with a fog machine, scents and biosensors, as well as a simplified version, downloadable from VOD platforms for Oculus Quest, Rift and HTC Vive.

### ***Talk about and feel trees***

*Forests* is an immersive and interactive experience that reveals the communication, intelligence and sociability of trees, invisible to our eyes.

Your car has just broken down on a forest road. It's a scorching hot day in the middle of a heatwave and your radiator is dry. You have no other choice but to take refuge in the oak forest nearby.

You notice that the oaks are suffering, as you are, from the heat. As you approach the tree the ground becomes transparent, revealing kilometers of roots looking for water in the depths of the earth. Streams of light spread and whirl around you, you feel vibrations, and woody scents tickle your nose -- all these things carry you into their world. The trees invite you to communicate with them. And so, how will you communicate with them?

Submerge yourself in their world, in their daily life. The trees will teach you about secrets of their survival during heatwaves: thirst, insect attacks, thunderstorms.

If you can empathize with them, and better yet, if you can participate in their ecosystem of mutual aid, the trees will, most certainly, help grow a branch on your wrist to show their thanks.

Through their story we show you a dreamlike version of the forest where their subtle, unseen messages becomes visible.

Through natural interactions, such as head orientation, eye movement rhythm, bodily movement, and hand and limb gestures you set off interactions in real time that enrich the experience.

To go even further, in the installed mode only, we introduce *biosensors* that take account of the heart beat (indicator of stress and calmness) and pupil dilation (indicator of empathy), such emotional clues enable the tree, to adapt to your behavior and your emotions. So, begin a nonverbal dialogue with the tree.

The project proposes different communication experiences, bringing together vision, hearing, touch, and for the installed mode, smell (scent printer).

Each experience is unique.



# Design Notes

By Fabienne Giezendanner

Having grown up in Ornans, in the forested region of the Loue Valley (Doubs), I felt the need to return there often after the death of a close family member. The memories and impressions of childhood came back, including those of walks in the forest and the trees, my first playspace. The painter Gustave Courbet, who is from this town, magnificently expressed the vital force of trees with his many paintings set under trees, notably the Oak at Flagey. It's natural that the experience of *Forests* would take place in this childhood place and that Gustave Courbet would be the starting point for graphic research.

The idea of a project about trees running its course, I met Ernst Zürcher. described as *the man who listens to the heartbeat of trees*. "An atypical researcher at EPFL, this forest engineer mixes science and spirituality to penetrate the mysterious links that unite trees and mankind." He is the author of the fascinating book, "Trees: Between Visible and Invisible. Be astonished, Understand, Act." (Actes Sud) from which we took a lot of inspiration for this project. (Erst Zürcher is also the scientific advisor of the project.)

As he so well describes it, trees remember traumatic events (sickness, drought, and other various attacks) and can anticipate in the event of attacks. They help each other and suffer together, whether they are together in a community (forest or park) or isolated in cities and yards.

Their ways of communicating are amazing:

- By roots, they have developed thousands of kilometers of microroots, creating a sort of internet of the forest.
- By releasing scents that are carried by the wind.
- By acoustic and electromagnetic vibrations near the Schumann resonance, imperceptible to our ears.
- By morphogenetic fields

Having frequencies of vibration in common with the flora and the fauna that live around them throughout the seasons, they can communicate with those beings. One question then came to mind:

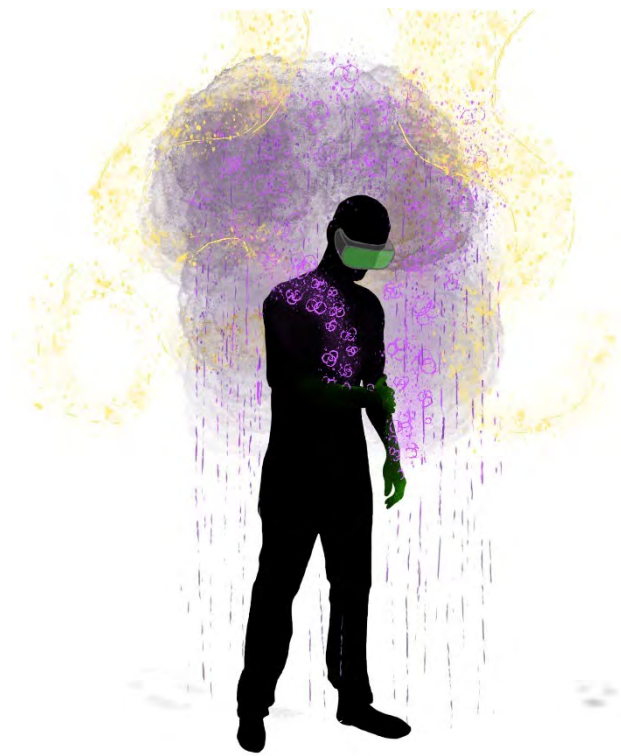
**If trees can communicate with each other as well as with the flora and fauna around them, can they communicate with us humans, and vice versa?**

Ernst Zürcher helped us discover this other reality, causing us to question our way of life that is all too often cut off from nature and become enthusiastic about the idea of enabling people to communicate with trees in a virtual forest.

Marcel Barelli, scriptwriter and animated film director, who is very involved in environmental issues and passionate about the subject, has worked with me on the writing.

More broadly, in a time where medical professionals speak of "nature-deficit disorder", where forest bathing (sylvotherapy), which is highly relaxing, is springing up everywhere, the importance of regaining familiarity with trees makes perfect sense.

Backed up by a scientific approach, the *Forests* project allows us to show visually and audibly, the invisible dialogues of trees in distress because of the heatwave. It puts us into a different time frame from our own, all while transmitting an ecological message about the importance of preserving and reconnecting with the forests. We can see there the possibility of developing dreamlike universes.



# Audio Design

By Thomas Rouvillain

## Sounds that hear and feel each other

The sound design of the *Forests* project is just as passionate as its visual design. In fact, if the goal of the experience is to show the invisible, it is also about making the inaudible heard! Sound, the voice, is mankind's most instinctive and most efficient means of communication. It transmits information and emotions, and it influences our behavior.

To reach an understanding of the communication among trees, it's necessary to transpose their language into an audible map that is accessible to the viewer.

One of the goals of the sound design is to awaken the senses of the viewer. Experience is sensory, so it is necessary to be in a position to listen and pay attention to the elements around us.

During the development several sound tracks will be tested.

Trees communicate with each other and with the Earth and Moon via low frequencies, called Schumann frequencies (frequency of trees and Earth), which vibrate at 7.8 Hz:

When we speak about frequencies, we are referring to the idea of waves, of vibrations and of resonance. The frequency of 7.8 Hz is no longer audible to man (though Yogis, during meditation, can sense it). However, we can use its harmonic frequencies (**31.32 Hz -- 62.64 Hz -- 125.28 Hz**), which are audible. These frequencies can be generated electrically, but can also be produced by tuning forks tuned to these frequencies. These tuning forks are, by the way, used in sound therapy.

The experience allows us to grasp the entirety of the forest space, and also allows us to unveil nature's invisible phenomena. The image used for this is transparency and streams of light. For the sound design, we would like to experiment with using different Schumann frequencies to create a palette of settings: filters, sample sizes, envelopes.

We will use these settings in the creation of sound textures and particles.

## Music / Atmosphere / Particles

The pointillism of certain images and the idea of amino acids that vibrate make me think of small elements degrading while vibrating.

This brings to mind the technique of granular synthesis. In this technique, sound is generated by assembling grains, or microsamples, of sound. These samples would come from sounds recorded in nature: wind in the leave, creaking of wood, etc.

[https://en.wikipedia.org/wiki/Granular\\_synthesis](https://en.wikipedia.org/wiki/Granular_synthesis)

<https://www.youtube.com/watch?v=aNIwp-MSz8g&list=PLQ8-ugkIS92aCFTkjFCofEHiuYFuZbllL&index=7>

<https://www.youtube.com/watch?v=XsOyxFybxPY>

Resonance / Interaction:

The resonance of an object is the increase in its oscillation when it is excited by the proximity of one of its natural frequencies. There exists, therefore, the notion of stimuli. And so, by the viewer's action, either direct or indirect, the tree can be lead to develop its expression. In this way different audible elements come together to create a harmonious ensemble.

The sonic writing will be linked directly with the narration and the intentions of tension or calm.

The points where it will be possible to modify the experience:

- Interaction with the environment: other trees, fauna
- Interaction with the surroundings: mist, rain, wind, thunder
- Streams of light belonging to the tree
- Streams of light belonging to the viewer



*Example of communication with visual and sonic vibrations  
The scenery becomes a musical instrument and the viewer a musician*



## Concept

*Forests* is a real-time 3D fiction / animated short for virtual reality headsets. It is available in an *installed* version, offering a strong sensory experience, as well as a version *for the HTC headset, Oculus Rift, and Quest*, downloadable from VOD platforms.

It's a scorching hot day. Your car is broken down and you're thirsty. You have no choice but to take refuge in the forest, which is also in distress because of the heatwave. You set off animated sequences in real time, translating invisible messages from trees, such as the vascular system that carries water, vibrations, scents from volatile particles that are carried by the wind, and communication flows through root systems. These messages take the form of light and sound variations, and in the installed version, they become olfactory and tactile (mist).

This sensorial approach allows you to better understand and empathize with the trees and to communicate with them without using words.

You are launched underground, through the roots of the tree, to the top of the tree, or through its vascular system. The microcosm intersects with the macrocosm for an unprecedented experience.



# Treatment

## Forests

*Note: to make the text more readable, details on the functioning of the visual and audio language between the viewer and the trees is explained in the section "Description of the Interactive System."*

### Scene 1 - Experiencing the suffocating heat

On a country road, a burning white light blinds us. We struggle to make out the enormous field to one side, and to the other, the comforting shadow of a magnificent forest of oak trees.

Inside the stopped car, the sunlight assaults us. The heat is unbearable. Looking at the dash, we see that it's 4:00 PM, 42° C (107.6 °F) and that we're low on gas. In the passenger seat are water bottles, all empty. The buzzing of mosquitoes invades the sound space in an unbearable drone.

If we press the start button then the motor stalls and doesn't start.

If we press on the door handle we can open it to get out and go toward the forest.

### Scene 2 - Experiencing the mist

Going into the forest, we are plunged into its reassuring shadow. Very soon we notice that the mighty oak trees are also suffering. Their leaves are starting to wilt, turning yellow and dry. A slight breeze picks up a couple of leaves and they whirl around with the sound of crumpled paper.

Walking, we crush the dead leaves that lay wasted on the ground. They crackle underneath our feet. The dried out ground shows glimpses of cracks here and there, and a path of round stones traces the bed of a dried up stream.

In front of us looms an oak, much larger than the others, which stops us in our treks with its imposing presence. The moss at the foot of the tree seems relaxing.

Suddenly, the sound of drops of water, falling heavily, becomes clearer and clearer. The ground becomes transparent. Now we can see deep into the ground, the long roots of the oaks, creeping slowly toward the sound of the drops of water. The roots turn toward a water table that appears under the transparent ground. Parched, they gorge themselves on water.

Then the thick bark of the oak becomes transparent, showing the water that spreads out: great streams spiraling up the tree, whirling in its cells.

Arriving at the top, the water is evacuated into the atmosphere in a light puff of mist. The mist floods over the forest and falls back down toward the ground. And so the magic takes effect, the mist, landing across the leaves, transforms into droplets with a crystalline tinkling. They fall heavily to the ground and are soon absorbed by the other plants.

The water then penetrates their vascular system. The leaves straighten up, birds and small woodland animals come out of the bushes. We can touch the drops and play with the sounds that they emit when touched by our hands. We feel their weight through haptic feedback (controller).

If we are empathetic with the oak, our hands also absorb water, which flows up toward our upper arms. This short rain releases the odor of wet earth. The forest has momentarily regained its pleasant freshness.



A branch starts to sprout on the wrist of the viewer.



### **Experiencing the Community**

A path of mushrooms grows up at our feet, inviting us to get a bit closer to the large oak. Now numerous roots appear underground. These roots connect to a group of small oaks through the mushroom roots. A liquid composed of a multitude of points of light passes from the large oak to the small oaks, from their roots up their trunk.

The small oaks fill up with light while stretching out their branches: they are growing. We can touch them and play with the sounds that they emit. Create a sweet and harmonious melody.

Depending the amount of our empathy, we discover roots at our feet that connect us to the large oak, as if we also were, nourished by it.

On our wrist, a twig begins to grow from the branch.

Nearby, the small oaks react differently from the others. They are bent over, leaning toward the ground. Then the large oak moves one of its leaves aside, creating a path for the light, which arrives to caress them. The small oak, reacting to this caress, turns toward the light, straightening its trunk toward the sky.

Suddenly red and hairy caterpillars begin crawling along the branches of the small oaks. They come to bite into the tender leaves. The melody fades and the trees begin shaking as if they were itchy. The sky clouds over, giving way to a dark and foreboding atmosphere.

Now we can clearly make out the crimson outline of the caterpillars as they advance, wiggling back and forth. They arrive from all directions, giving off shrill sounds. They climb up the trunk, then the branches, and some find their way to our wrist.

The big oak then sends light pulses through the root network to alert its relatives. They cross a large and vast area. As soon as these pulses reach the oaks their leaves release fragrant particles similar to small luminous stars.

Carried by the wind, the particles quickly spread everywhere in the forest, giving off an ethereal sound. As if carried by an invisible current, they spread out among the caterpillars. Squirrels come out of the tree trunk, straighten up and sniff the odor before running away. This increasingly powerful ensemble now seems more and more like a collective alarm.

A chickadee (tit) is attracted to one of these fragrant stars. It follows the star's movement which guide it to one of the branches of a small oak, where a caterpillar is crawling. It gobbles the caterpillar up.

If we are calm then fragrant stars come out of our hands. We feel their contact through haptic feedback (controller).

We can touch them, play with the sounds they make when they touch our hands, and spread them around us by moving our arms. These sounds become louder and brighter.

Then another chickadee (tit) arrives, then two, then five, then ten, in the same way, guided to the caterpillars by the fragrant stars. Some of the chickadees (tits) land on our hands. The gobbled up caterpillars disappear in their stomachs (which we can see through)...

In this dreamlike maelstrom created by the movement of fragrant stars and flying birds, the small oaks and our wrist are quickly rid of the caterpillars.

Now, the forest is bathed in the soft light of a late summer day.

On our wrist, buds have sprouted on the branch and the twig.

### **Scene 3 - Experiencing Schumann and cosmic vibrations.**

The orange light of the setting sun hides its face abruptly, giving way to a leaden sky. Thunder rumbles in the distance. Fireflies gather together near the oaks. Excited by the storm, their jagged, jerky twirling creates small, fragile beams of light that set off to conquer the darkness. They enshroud the trees, giving them a halo of golden light. The heavy humidity of the air releases strong scents of bark and humus.

Suddenly, lightning strikes the large oak tree, deafening and blinding: a wave of light creeps across the veins of sap and down into the roots, eventually disappearing. The fireflies, too, have disappeared. Stressed, the tree sends out vibrations in clashing, discordant forms.

If we touch the large oak tree then the vibrations emitted by the physiological processes running through it become clearly visible. They are shown as streams of light.

We can touch them and play with the sounds they make. These fast, jerky sounds evoke the pain of the tree. When we pass our hand through a stream of light the texture of the sound becomes more detailed, as if we were looking at it through a magnifying glass. We feel the rhythm through a haptic feedback (controller).



If we are calm and empathetic, the rhythm calms down and the streams of light become more harmonious. The trunk offers no resistance and we go inside.

Embedded in the streams of light, we flow to the crown of the tree and we pass through it.

From afar, we discover that these vibrations spread from one forest to another and, closer to us, from one tree to another. All the vibrations converge on the injured trees: they are talking to each other. The streams of light, joined together, create magnificent arcs of light. Thanks to these vibrations, the birds and the fireflies come back. The whole forest concentrates on calming the stricken tree.

Our hands and our body resonate with the trees and the fauna. The streams of light meet and form vivid arcs. We feel these resonances via a haptic feedback (controller).

The calmer we are, the slower our heartbeat and more dilated our pupils, the stronger the resonance of the trees. We hear its harmonics better. Then, the vibrations go further and head off toward the Moon. They now communicate with the stars and penetrate down to deep into the ground. The oak appears as a catalyst, connecting the sky, the earth, and the living beings around.

On our wrist, the buds have become leaves.

Fade to black

END

# Visual Universe

By Igor Carteret

The experience alternates between a *figurative rendering* to express the realistic passages (beginning of the story and transitions between the scenes) and a very stylized, *almost abstract, graphic rendering* in order to make the invisible visible.

For the figurative *rendering*, our sources of inspiration were John Klassen and Gustave Courbet. John Klassen for his simple shapes, especially those of the animals and the texture on the bark. Gustave Courbet, firstly because he often painted Ornans and the Loue Valley (the place where the experience takes place): the mixture of rocks, streams and forests, but above all because he painted by superimposing touches of colors, which gives birth to an abstract style, which we tend towards for the stylistic rendering of the "invisible" part.

## Inspiration board for figurative mode



John Klassen



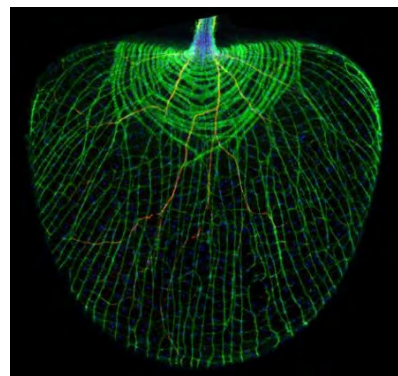
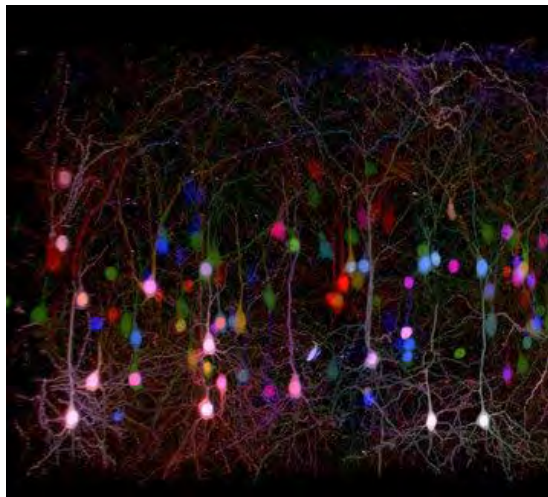
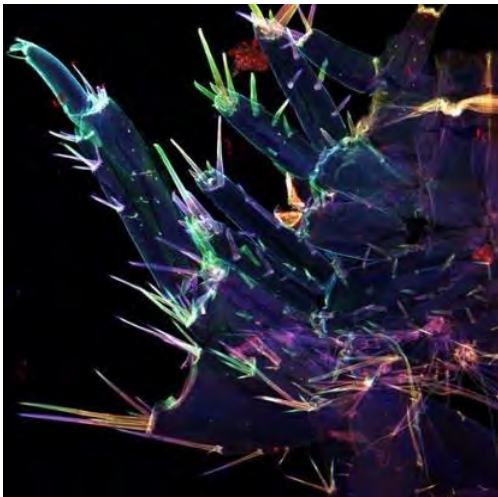
Gustave Courbet - *Sous-Bois*, *the Bremen Valley towards Ornans and the Oak at Flagey*

The *highly stylized, almost abstract, graphic rendering*, both sensitive and lively, brings out the vital pulse of the trees, the streams of the trees and of the viewer, and the fragrant particles. We are considering a limited range of colors that stand out against a dark background. Our sources of inspiration are images taken under the microscope, which reveal geometric shapes with a limited yet vivid range of colors, [and also the work of Marshmallow Laser Feast's studio, notably with the VR \*In the Eye of the Animal experience\*.](#)

## Mood board for the changeover to the invisible world



*In the eyes of Animal*



*Plant and tree images taken under a microscope*

Reference: "Cyclosis in Elodea" <https://www.youtube.com/watch?v=aoFgYsfM1mU>

The idea is to have a **2-in-1 graphic design**: the patterns on the trees and on the ground which can be made out in "figurative" situations become colored and transform into a streams of light to make the invisible tangible.

To call back to the idea of granular synthesis that will be used in the streams' sound design, we will look for an animation that combines small shapes in order to give the smells, the mist or the vibratory flows, a form



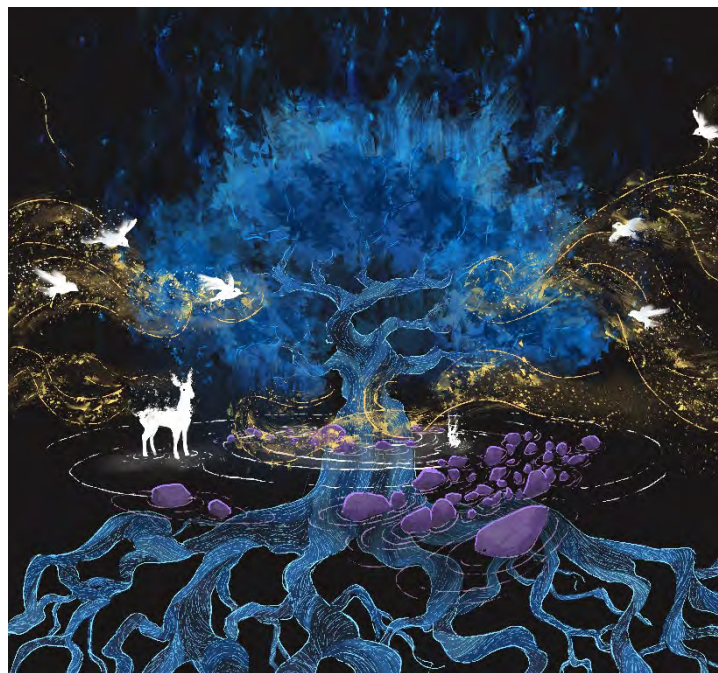
close to a pointillist rendering. A gouache medium makes the universe sensitive and poetic. **The universe then becomes a palette of painter who mixes his colors according to these interactions.**

To illustrate the shift from visible to invisible, the bark of the wood, which is patterned with very ethereal lines, begins to swirl and takes on color, and the background darkens. The ground, now transparent, is shown by the circular waves, creating the pulse of the trees (like a heartbeat).

In the invisible world, the viewer's virtual hands are white just like the animals, to better highlight these mixtures of colors.



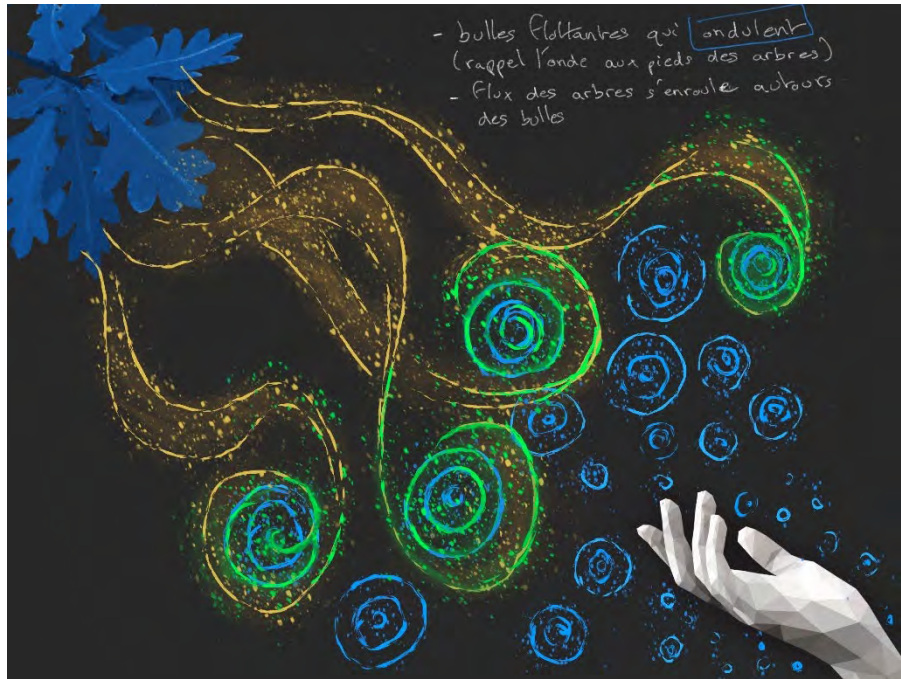
*The decor in "visible" figurative mode. The shape of the tree is inspired by the Oak by G. Courbet. (Research in progress)*



*The decor in invisible mode: the ground is visible thanks to the waves left by the pulsing of the trees, the animals are white, the streams are granular and the medium resembles gouache. (Research in progress)*

In addition, if the viewer is in symbiosis with the trees the colors mix. For example his blue streams mix with those of the tree which are yellow, creating a dialogue composed of green streams (explained below). Conversely if they are not empathetic, the streams repel each other without mixing, but the story continues.





Here the viewer is empathetic and emits blue streams which mix with those of the trees which are yellow.



Here the viewer is more distant and emits red streams which do not mix with those of the trees which are yellow.  
 (We believe / hope that this situation will be infrequent).



*Example of animals given form in the in the invisible world by the vibrations they emit.  
Their vibrations are close to those of trees, so they will always be empathetic with them.  
They will therefore easily mix their colors with the streams of the flora.*



*Research for the passage about mist and rain*



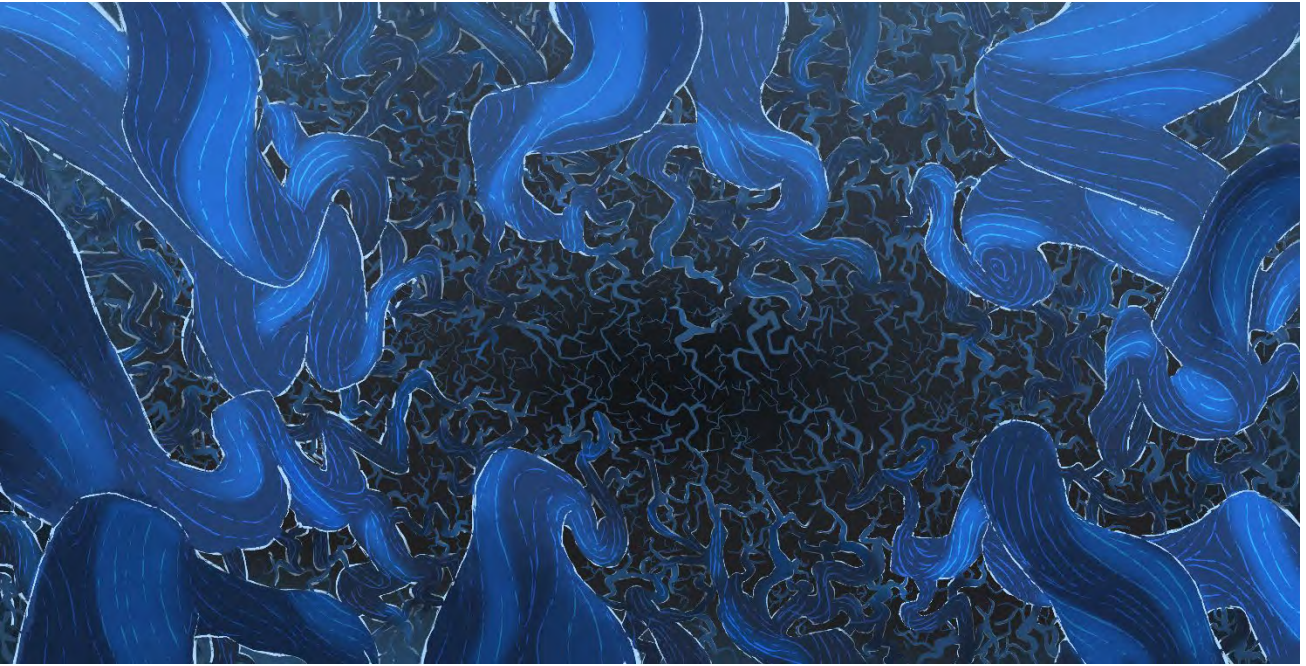


*Research for the trees' streams*



*Research for the attack of the light-absorbing caterpillars.*





*Roots beneath our feet - invisible mode.*



*Forest - invisible mode*

## **Directorial Intentions** By Fabienne Giezendanner



I found the subject of "communicating trees" particularly suitable for an immersive and interactive experience in real-time 3D animation. In this experience, I invite the viewer to partially transform into a tree. I chose to place the experience in the context of the heat wave, which stresses trees as well as humans, so as to have a mirror effect, on the one hand, but also a problem to solve.



The *Forests* experience will be staged with real-time 3D animations, sounds and very poetic interactions. In this work I will add touches of philosophical remarks on living together, offsetting the idea of competition between trees in communities, as well as the importance of communion with and respect for nature.

Since the beginning of my professional life, I have alternated between scriptwriting and directing *linear* films and interactive experiences.

Thanks to virtual reality, I can finally combine both interactive narration and that of cinema. My motivation to write and direct has always been to provide the viewer with a cinematic experience. I also like the space of freedom provided by VR, for which language is still being discovered, thus giving the opportunity for real inventiveness in writing.

My experience of VR and immersive fiction, with the Dreamin'zone and Petit Malabar projects (an immersive fiction for Kinect broadcast at the Museum of Natural History as part of the Meteorites exhibition) gave me the chance to meet many professionals. The exchanges that I had with them allowed me to progress and to adjust the immersive writing of my films, in particular by developing the notion of elastic narration. These days, while directing, I bring together natural interactions with characters programmed with artificial intelligence. They react and adapt to the behavior of the viewer, giving them the impression of a real presence. This latter point seems to me to be the keystone of successful immersion.

With the *Forests* project, I would like to push this notion of presence and elasticity of experience even further by adding sensory immersion. Indeed, by choosing to reveal the hidden side of the trees' subtle messages, I quite naturally put the viewer in a position to use his senses: sight, sound, touch, and smell. The goal is to make the viewer empathize with the trees through non-verbal channels and to increase their immersion

Finally, I want to intrigue the viewer and make them dream, and I hope, invite them to take a new look at the trees, make them want to rediscover and respect the forests, an essential organ for the survival of our planet.



Berner Fachhochschule  
Haute école spécialisée bernoise  
Bern University of Applied Sciences

Bienne, le 18 juillet 2019

**Objet:**

**Recommandation du Projet d'immersion en réalité virtuelle « Arbres - une expérience VR interactive »**

Madame,

Monsieur,

Par la présente, je désire recommander le Projet Immersion en réalité virtuelle Madame Fabienne Giezendanner auprès de votre organisation.

Ayant eu l'occasion de lire en détail le concept de ce projet et d'en discuter personnellement avec sa conceptrice, et au vu des réalisations figurant déjà à son actif, je puis témoigner de la solide compétence de Madame Fabienne Giezendanner pour mener à terme ce projet original et novateur.

Sur son invitation, je vais suivre l'écriture du projet et y apporter une caution scientifique.

C'est donc avec empressement que je vous recommande de soutenir Mme Giezendanner et son beau projet.

Demeurant disponible pour tout renseignement supplémentaire, vous pouvez me rejoindre aux numéros de téléphone 0041 77 449 23 61 ou 0041 32 322 43 80, ou à l'adresse email [ernst.zuercher@bfh.ch](mailto:ernst.zuercher@bfh.ch)

Bien à vous,

E. Zürcher

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