Podcast “Filming in Portugal. See the big picture”

Transcription of the episode 6 with Nuno Fonseca

[00:00:14 Martin Dale]: Welcome everyone to this episode of the podcast “Filming in Portugal. See the big picture”. A podcast of the Portugal Film Commission. I'm the host, Martin Dale, I'm a corresponding journalist with *Variety* based here in Portugal. And today we're speaking to Nuno Fonseca. Nuno is the CEO of Sound Particles, a firm founded in 2016, based in the city of Leiria, which is about a one-hour drive from Lisbon in Portugal.

Through Sound Particles, Nuno works for audiovisual and film companies throughout the world, with an important presence for productions in Hollywood, but pretty much across the board, across different countries. We thought it would be an excellent idea to get Nuno insights on his specialized sound expertise, which is based on the specialized software that he's developed.

Although is based on this little corner of Portugal - which is itself a quite peripheral country – he has managed to achieve considerable international success and we would like to talk to him about his interaction both with international and domestic productions here in Portugal.

So, Nuno, thanks ever so much for being with us. Could you talk a bit about your own background, and how you ended up setting up Sound Particles?

[00:01:24 Nuno Fonseca]: Okay, so hi Martin, it's a pleasure to be here. It's always a pleasure to me to share with others a little bit of the things that we are doing. So, talking a little more about me. For many years I was a university professor. I was actually teaching computer science in one university and at the same time teaching music technology on a different university. So, I always had one feet in each wall, one feet in the audio world and music and other feet on technology and computers.

I pretty much continue my academic career doing that. At some point, I have this crazy idea, probably 16 years ago, that… Of course, I love movies. And at some point, I realized that the most interesting visual effect that I was seeing on movies, most of all, is particle systems, a technique in computer graphics where you generate thousands of small points to create things like rain and fire and explosions and fairy dusts. At that time, I thought:

“Okay, wouldn't it be nice to do the same thing but with sound?”

Instead of creating thousands of points in the image, I thought:

“Okay, what about creating thousands of small sounds that altogether will create these fantastic soundscapes?”

But at the time, it was just a crazy idea, like so many others that cross our mind. And then in 2012, I had finished my PhD on a different topic. And still, since no one was using particle systems for sound, as a computer nerd that I am - because this face doesn't fool anyone - I decided:

“Okay, let's start to create my own software.”

So, I started creating Sound Particles. It's a CGI kind of software but for sound. We have this endless 3D space. Instead of putting CGI objects, you put sounds. Instead of using virtual cameras, you use virtual microphones. And then you can use particle systems to generate literally

thousands of sounds. And it was a project, my pet project, after hours and in the weekend. At that time, I thought:

“Okay. I think this could be particularly interesting for big productions in Hollywood, you know, those superhero kind of things with explosions everywhere. But let's face it, what are the chances of someone in Portugal creating a software to be used by Hollywood studios, particularly in the big productions?”

But I didn't care. It was something:

“Okay, I will continue creating the software, even if no one will actually use it because it's giving me a lot of fun. So, I will continue creating the software.”

And then, in 2014, I went to LA to a scientific conference. But before going there, I decided to send emails to five or six people in the industry saying:

“Okay, I'm doing this. I think this could be particularly interesting for big productions. And I'm going to be in town in two weeks. So, if you want to know more, just let me know.”

And then the first reply that I got was actually from Skywalker Sound, the mythic sound studio created by George Lucas and that today is the biggest and the most well-known studio for cinema in the world. He invited me to go to the ranch to do a presentation and that was the beginning. Within six months, I ended up doing presentations at Warner Brothers, Universal, Paramount, Sony, Fox. Later on, Disney, Pixar, Netflix, Apple, Google, and many other places. That was the beginning of Sound Particles.

[00:04:58 Martin]: So this kind of 3D sound you're creating, in order to be ought to appreciate it, is that only in cinemas with surround sound systems or home cinema systems also with surround sound? Or can it have applications even with a normal TV set at home, for example?

[00:05:12 Nuno]: No, actually, the interesting thing is that, of course, you can take advantage of this if you're having 3D systems like Dolby Atmos or things like that. But even if you are creating something in stereo or even in mono, this could be quite handy. So let me give you an example - and this is the typical application of a Sound Particles’ project.

Imagine that you want to create a big scene like a battlefield, for instance. The typical approach would be: you go to a digital audio station, to audio software, an explosion here, you import another explosion, a machine gun, another machine gun. And probably after eight hours of work, you end up with 50 tracks with 50 sounds playing at the same time.

With Sound Particles, you can actually go there and in 10 minutes say:

“I need 10.000 sounds spread over a square mile.”

I import 300 or related sound effects, do some random movements, put the virtual microphone there - it could be stereo 5.1 or Dolby Atmos - and it captures everything. So you end up with the soundscape of a battlefield in 10 minutes instead of eight hours, with 10.000 sounds instead of 50 sounds. And it's a matter of productivity, scale, but above all, the quality of the sound is much better.

So, even if you are simply doing this in stereo, you are still taking advantage. Yes, you are using this 3D approach, but even on the stereo, it's almost like a CGI. A 3D approach in CGI could be quite interesting, even if you are not using stereo glasses or something like that. It's exactly the

same thing with sound. Yes, we are using a 3D workflow, but even if you are working only in stereo, it has a lot of advantages.

[00:07:05 Martin]: But just to explain to the kind of general viewer, when you said in a short space of time you could create 10.000 sounds, is that in any way because you're using some kind of artificial intelligence in the sound or it's just a software that has all this kind of database that it can immediately put into place?

[00:07:32 Nuno]: Pretty much what we are doing is copying the same concept like in particle systems with image. For instance, you have a CGI scene, and you want rain: you don't go there and start to animate each raindrop. You simply go there and say:

“Okay, I need to generate this amount of raindrops per second. I want the rains to follow this direction or some randomness.”

You simply adjust a few parameters and then the particle system will generate these thousand or even millions of objects in the scene.

What we are doing with Sound Particles is the same thing. You simply go there and say:

“Okay, I need 10.000 sounds spread over this square mile, for instance.”

What it does is simply to create random points spread within that area that I specified. Then I say:

“Okay, let's import 50 or 100 sounds into my scene.”

And then each particle will randomly select one of those and reproduce them. Then we say:

“Okay, let's add some random movement.”

And you say, you want very fast movement, very slow, and pretty much you are simply controlling a few parameters and then the system will generate thousands of instances with those parameters that you mentioned, with some random numbers. But the interesting thing is that this randomness is actually what makes this much more organic.

And once again, doing the parallel with CGI - even if I try to animate some raindrops, and I only made a few, and then I start to copy paste them, but at some point it's not going to feel quite organic because something is missing and I don't know exactly where. So, it's the same thing with sound. I'm simply creating things and then the software will make sure that the thousand, if I need 100, 1.000, 10.000, 100.000, it's up to the system to make sure that he manages all of these sounds within the parameters that I specified. And then I will create something that is much more interesting than actually trying to do everything by hand.

[00:09:25 Martin]: Do you think this kind of random ability is a certain kind of artificial intelligence or it's just a question of using particle systems? It's a different concept from artificial intelligence, is that right?

[00:09:36 Nuno]: No, it's a different concept. We do artificial intelligence internally in other areas of the company. For instance, we have five PhDs on the team and from those five PhDs, at least three were specialized in artificial intelligence, so we know we have the know-how. But in this case, we don't even need that kind of artificial intelligence. Simply by having random numbers and random behaviors, it's more than enough to get this fantastic result.

[00:10:06 Martin]: So when you were talking with people such as Skywalker Sound back in 2014, they were obviously already quite sophisticated in terms of sound design, in terms of surround sound systems and so on. But was your solution based on particles systems completely new for them? Or were there some examples already in operation and you were just doing it better?

[00:10:28 Nuno]: No, it was completely new to them, and that's why they really thought:

“Okay, let's know more about this because this looks interesting.”

So, no one was actually doing anything similar. There are a few things that will allow to create a few random things, but also things very manual, not in 3D or this kind of CGI kind of approach. And that's why they had the interest and even at the moment, when I was there for the first time doing that presentation, they started asking me:

“Okay, when can we start playing with this?”

And I said:

“It's a prototype. So, give me at least one or two months just to make sure that the software will not start crashing every time that you do something more strange.”

And then two months later after my first presentation there, I send them a better version of the software and they started to use them. Not only them, but a few more people within Hollywood. And then the first movie to actually use the software was the remake of the *Poltergeist* that was released in 2015. That was the first Hollywood movie to use the software. And since then, we have a lot of people using it from *Star Wars*, *Game of Thrones*, *Indiana Jones*, *Mission Impossible*, *Oppenheimer*, and many others.

[00:11:51 Martin]: That's great, it's been a great success. In terms of CGI, companies like Skywalker were already using particle systems for visual creations, weren’t they? Did that help them understand what was involved when you wanted to apply particle systems to sound?

[00:12:06 Nuno]: Not much because usually it's ILM, the other company from the Lucas Films, that do the visual effect. Nonetheless, they are more, how can I say? They have much more ability to get something new and they are always looking for new things and they have also these fantastic sound designers that sometimes you only tell them something and they automatically start to be highly creative.

So actually, one of the things that I like on what we do, is that as soon people start to understand what is possible to do with the software, you almost see a bright in their eyes because their brains are already thinking:

“Oh my God, now I can do this immersive 3D fire” or “I want to be able to do the sound of 100 flying violins or whatever.”

So, it's quite rewarding to see people actually starting to understand the concept. And since they start to understand the concept, the ideas start to flow a lot with things that they want to try with this new kind of approach.

[00:13:15 Martin]: And how does this work in practice? It's a proprietary software that you kind of license them to use, or they have to use your own technicians to produce all the sound effects. How exactly does it work?

[00:13:26 Nuno]: No, it's pretty much like a regular software. So, it's like Maya or something like that. They buy some license from us or some subscriptions. Eventually they may subscribe the software to a project or they may buy user licenses. And then they download the software and start using the software. Of course, we are always here to help them. And sometimes people approach us. For instance, I remember when it was the *Ready Player One,* from Spielberg. At some point, the sound designer approached me and said:

“Okay, I'm going to need 200 lasers crossing the screen. Can you help me achieve that with Sound Particles?”

And in our case, in two minutes we create something that pretty much mimic that kind of behavior that the sound designer wants. And we simply send them the project and then they simply bring their sounds and fine tune everything else. So, we are here most of the times, we help them with a few things. For instance, recently with *Oppenheimer*, Richard King, the Oscar winning sound designer, talked to us and said:

“Okay, can someone from Sound Particles come to my studio for an afternoon or a day just to give me a few insights?”

And we have a person in LA that went there and helped him understanding better the software and how to use it and then ended up being used on *Oppenheimer*. So, it's more or less the kind of model that we do with people.

[00:14:57 Martin]: So the kind of business model and the way you're working, does that mean that you've now got lots and lots of companies using the software, making a kind of annual renewal, or it's a small number of companies and the software is actually more expensive per company? Or is this kind of a mass market approach with lots and lots of smaller producers as well using it? How exactly does it work?

[00:15:17 Nuno]: No, essentially we try to approach this on a more democratic kind of way. We could eventually say:

“No, this is a highly expensive software and let's put this only on the big Hollywood studios.”

But the problem is, and actually what happens in Hollywood is that sound, a lot of times, is almost like the underdog of the production. Sometimes you have productions with 200 million in budget and then you simply hire a few freelancers that will need to bring their software. So sometimes you are actually selling the software for a freelancer that will buy the software with his salary.

So, our approach was:

“Okay, let's have something that is more scalable with a mid-range kind of price.”

But then you can reach every single sound designer that is interested in getting the software. So yes, we have a lot of people using this on these big Hollywood studios in Hollywood, but also, we have people around the world using this to other things for podcasts, for TV shows. So the idea was to make it more or less democratized instead of simply say:

“Okay, we have a very expensive software and then it's only used by eventually five potential clients that are the five biggest studios in Hollywood.”

Our approach was slightly different, let's democratize. Yes, we have Hollywood like the top of the iceberg, the top of the pyramid. But then we have all of these sound designers around the world that still are able to use Sound Particles for their projects.

[00:16:56 Martin]: You don't need to give us exact figures, but we're already talking about thousands or tens of thousands of users, in the sense of the scale of the operation?

[00:17:03 Nuno]: At the time, we're going to talk about some thousands of users in terms of Sound Particles software. We have other software also, more plugins and things like that, but in terms of Sound Particle software itself, we are talking about a few half a dozen of thousand users around the world.

[00:17:23 Martin]: Your team itself, like you said you have members of the team in Los Angeles. So, again without giving us precise figures, what kind of size is the team and where are the people based?

[00:17:34 Nuno]: So Sound Particles has around 25 people nowadays. It's based in Portugal. The only exceptions: we have a person in LA and another person in London, okay? But the rest of the team is in Portugal. We are a deep tech kind of company. What we do, it's necessary a lot of technology and lots of research to be able to implement some of the things that we do. And that's why we have, like I mentioned, the five PGDs on the team, and half of the team have masters and things like that. So that's more or less the size of the team.

And we are pretty much based in Leiria, in the middle of Portugal. In our case, since we don't work particularly to the national market, because the movie industry in Portugal is very, very small. In our case, less than one percent of our revenues comes from Portugal. So, since we are pretty much working globally to the rest of the world, being located in the middle of Portugal or in Lisbon or some other place, it's pretty much the same.

[00:18:42 Martin]: Are there are Portuguese productions, film and TV productions, who are also using your software? And for example productions benefiting from the Cash Rebate scheme, which is including some more international productions, or the fact that you're based in Portugal, have you seen this kind of local involvement, using your software?

[00:18:59 Nuno]: Yeah, we have a few users here in Portugal. One of those users, it's people from Loudness Films that also have some license of our software. But once again, like I mentioned, it represents less than 1%. I would say that around 35, almost 40% comes from the United States, in particularly California. And after that around 15, 18% from the UK and then pretty much the rest around the globe.

[00:19:35 Martin]: You mentioned how often sound is a little bit of the underdog in any production. I always think that the term audiovisual, audio is half of the equation as it were. Could you talk a bit about that, I think people do underestimate how important the audio is to the success of any production.

[00:19:50 Nuno]: Yeah, let me give you a few examples. For instance, everyone knows the famous quote from George Lucas that says:

“Sound is 50% of the movie.”

Apparently, there was a comment from someone from Skywalker saying:

“Okay, where is 50% of the budget?”

But for me, of course I have a biased opinion, but I think the main reason that people still go to the movie theaters, it's because of the sound experience.

Because in terms of image, yes, you may have a good image on the cinema, but nowadays the difference between modern television and movie theater is not that big. There's some, but it's not that big. But the difference between the sound experience that you get at home versus any cinema, even a cinema that was created in the 90s, still has a much better sound experience that you have.

And then we start looking at the list of the top movies in terms of revenues, and you see a lot of these superheroes. Because nowadays, let's face it, most people are not going to the cinemas to see dramas or comedies. They go there to see these superheroes, big productions, epic movies. And sometimes people think:

“Oh, it's because of the CGI. They like going to the movies because of the CGI.”

No. They like to go to movies because these big productions give you a sound experience that you cannot have at home. For instance, *Top Gun*, one of the biggest movies of last year. People, they don't want to see *Top Gun* in the TV screen. They want to see that on a movie theater. And it's not because of CGI, it's because of that sound experience. A movie like *Top Gun* on a regular TV screen with tiny speakers will not be the same.

So, I think that sound is the main reason that people still go to the movie theaters. And movies that allow us to get this sound experience like superheroes, epics, sci-fi, these kind of things, it's actually why people in this case, they go with and don't wait for the streaming to have them.

Let me also give you another perspective, because sometimes when you think about sound you say:

“Yes, music, I understand there is some art associated with that. But pretty much the sound design, come on, it's putting the sound of a door or the car passing by.”

For instance, with *Mad Max: Fury Road*, the movie that was released a couple of years ago, at some point, the director was not very happy with the end result in terms of sound. So near the end of the post-production, he actually hired Mark Mangini to go there and pretty much redo the sound. They did test screenings with the movie, with the original sound, and then with the new sound of Mark Mangini. In practical, the only difference was in terms of sound design, pretty much all the rest were the same.

Well, before this change, it had a score of around high 70s, okay? After the new sound, the score of the movie went from mid 70s to high 80s. So, we're talking about an improvement of 10 points on the overall performance of the movie by audiences. And the only thing that changed was sound. Yes, the problem with sound is that works a lot in terms of subconscious.

So, you listen to sound, you go to see a movie with bad sound, and you probably come out and say:

“I don't like, I didn't like the photography very much.”

But actually, it's the sound that you don't like. For instance, film students are known for being very bad in terms of sound. So, I think sound is something quite important and can make completely difference in a movie. But most of the times, you go to see the list of credits on, for

instance, a *Star Wars* movie, and you probably see around almost 2.000 people working in visual effects and then 40 people working with sound. In terms of scale, it's a completely different scale.

And then that affects everything else. Because even in terms of research that is done in audio, it's not done much because the studios themselves don't invest much. For instance Pixar has this fantastic idea of having scientists and artists under the same roof, and each one pulls for the other and things happen. Unfortunately, this happens only on the image side, because on sound, it's pretty much outsourced by Skywalker and they do a fantastic job.

But I feel the need of having more research even in terms of sound. Some years ago, we were on the finalist group of the scientific award from the Academy. And I was there at the committee, and each one of those projects that were under consideration had to do a presentation to the people of the Academy. And from the 48 projects that were there, only two were regarding sound. Everything else was regarding image. So, as you can see, it's something that we need to get a little more attention in terms of the sound community, because it's something quite important and could bring a movie, a good movie to a fantastic one, if you really invest in sound.

[00:25:22 Martin]: You're talking about the sound community and you mentioned that over 50% of your revenue is outside, North America and the UK. So obviously that means that Europe, Asia, must also be important centers of production. When we're talking about visual effects, there have been big bases, such as France and the UK.

And for *Variety* I've interviewed people - again more to do with the visual effects than the sound effects - but some of them also talk about the sound. And we are not just talking about big productions, like superhero films. Sometimes they can be very auteur driven films, but they use sophisticated visual effects and sophisticated sound. Now, I presume some of your clients are also in France, Germany, Italy and so on. And presumably some of the productions are quite artistically driven. Ddo they also take advantage of your software?

[00:26:10 Nuno]: Yeah, exactly. We have a lot of users, for instance, in France, in Germany, in the Northern Europe. Because of course, if you're doing a big superhero kind of movie, something like Sound Particles is a perfect fit because actually the highest production, the highest of the complexity in terms of sound design. And that's why Sound Particles is used a lot.

Nonetheless, we have a lot of users that use Sound Particles to very regular kind of movies. Imagine that you want to create the sound of a restaurant. You can go to Sound Particles and simply bring sounds from people handling the glass and the dishes and people talking and all sorts of things. And then you actually be able to create the soundscape of a restaurant within Sound Particles.

Or imagine that you have a scene that is in the middle of the woods, and you simply want some particles to generate the nature, the river over there, the winds passing through the trees. And the idea is you can use this kind of tool to create these fantastic soundscapes. It could be in the middle of the woods, it could be in a restaurant, it could be in the center of a small city, and you pretty much use Sound Particles for them.

Of course, like I mentioned, we have thousands of viewers, but there aren't thousands of sound designers working on big productions. So, I would say that we have even more users working in independent films than actually users using on the top blockbusters from Hollywood.

And with the software allowing you to get this kind of natural soundscape - once again, whatever soundscape it is, but gives you a much more natural [soundscape].

The same way that when you see a movie with bad visual effects and you say:

“Okay, no, that's very bad visual effects.”

But if you ask people, people will not be able to tell you why. They will not be able to say:

“Oh, because it's dual shadows or it's the dynamic range that doesn't fit.”

No, the brain simply says:

“Okay, it's fake.”

The same thing happens with sound. We are listening to sounds and sometimes your brain simply says:

“Okay, it's fake. Don't ask me why, but this is not regular, this sounds too much fake to me.”

And that's why we need to do whatever we can to get this kind of sound production that feels natural because, once again, if the sound is natural, you are already more than half in terms of the immersion that you need to get over there. Because you want to be immersed on that story that the director wants to tell you. And for that sound can be a very powerful tool.

[00:28:59 Martin]: In the past I've spoken to a sound engineer and he said that sound is the cheapest form of effect. For instance, you can create the sense you're in a restaurant or you're by the seaside or you're in a forest just through the sounds. You can film someone on a film set but as soon as you hear the sound of the sea you are suddenly transported. Do you agree with that?

[00:29:19 Nuno]: Completely. Imagine that I'm here and now I want to simulate like there is an earthquake or there is an attack outside. I can simply shake the camera and then add sounds into it.

For instance, Robert Zemeckis, when he was doing *Back to the Future*, he told, for instance, Alan Silvestri, the composer:

“I want you to bring my production to sound like it is a much better production than it really is.”

So you get the right music there, you put the right sound effect, and it's very, very cheap compared with having an army of visual effects trying to create something. And even in terms of telling the story and doing movies, sometimes you can use sound in your adventures instead of going for a highly complicated visual effect shot. Now the right sound is much cheaper and will get almost the same result. So, I totally agree with that sound engineering that says it's a very cheap way of doing effects.

[00:30:28 Martin]: To create a soundscape, you need these particles, but you also need to draw on a database of sounds. So, is that database part of the software or is that a second stage that they use the software to access other databases?

[00:30:42 Nuno]: No. It's the same way that we only provide the software, the same way that, for instance, Photoshop is just the software. It doesn't have a stock photography method. The idea is, you bring whatever you want to bring to the software. So, for instance, on the last season of *Game of Thrones*, there are these epic battles with these zombies attacking Winterfell and other things. Okay, what the sound designer did?

Paula Fairfield was actually using Sound Particles and then:

“Okay, let's bring sounds of bones breaking or sounds of people walking on the snow or sounds of other kind of things like that.”

And pretty much they will bring the kind of draw material that you want to bring into Sound Particles and then you create the complex things out of it.

If you are working on completely different series, for instance, imagine on *Star Wars*, you want to use Sound Particles to create this kind of energy, electricity, fire, sparkles or whatever. Okay, you bring your own material. Most of these sound designers have these huge collections that they are accumulating through their careers, in some cases with millions of sounds. And part of the art is to choose the right sounds that you want to use as a source material. And then you bring it into Sound Particles and it simply works.

For instance, I was talking a few last month with Gary Rydstrom, the supervising sound editor from *Indiana Jones*. And he was telling me that sometimes he simply brings sounds to Sound Particles, choose a random preset, and if he likes the result:

“Great. I can use now this for this scene and for that scene.”

The idea is they bring their own sounds, and actually that's part of the art that they do, is to pick the right sound. Because sometimes the most difficult thing is to choose the right sound. And then with Sound Particles it's only a matter of using them to create the soundscape around them.

[00:32:46 Martin]: So the software works seamlessly with many different databases. So, I presume it works a bit like Photoshop. It can access all different formats.

[00:32:55 Nuno]: Yeah, you are able to import any kind of audio format files, and the software is able to process them and then export, and then you simply bring that into the final mix. And even since we are talking about these particles and this randomness, for instance, imagine that example of the battlefield. You can actually, if you want to do it at Sound Particles, differentiate between the sounds of explosions, and the sounds of screens, and the sounds of the breeze, something like that.

Because imagine that during the mix, the director says:

“Okay, I really like the screams, but I want more explosions or less explosions.”

And so you can, at Sound Particles, export this as different stems; only one stem: only Dolby Atmos, but only explosions; Dolby Atmos, but only the breeze; Dolby Atmos, only screams. And then during the mix, you can control the volume and say:

“Okay, I want more of this, less of that.”

There is a lot of things that you can do. And even one of the things that we can do with the software, is that you can even be able to import CGI information. So, imagine that you work with animation or you are using or working on a visual effect shot, you can actually import the information. If you know that this object to this kind of movement, the camera like that, you are actually able to make sure that the sound is perfectly aligned.

[00:34:17 Martin]: And also in 3D, right?

[00:34:19 Nuno]: In 3D. Because, for instance, nowadays, even in a movie like Pixar, you have these CGI objects, you know exactly the positions of every single object on the screen. Nonetheless, when it comes to sound, all of that information is disregarded and you continue to

use the same workflow like 50 years ago of someone looking at the screen and trying to adjust some knobs on the mixer to try to fit the exact positions where they are.

And for me, if we have the CGI information, why not use them directly? Why not use the CGI and make sure that, yes, of course, the mixer can go there and redo things and make it stronger or weaker in terms of the movement and all of those things. But at least as a starting point, it's much more interesting because then he can use the rest of his time to a more creative use instead of:

“Okay, now I need to adjust the position, the panning of the helicopter, now I need to do that for the car, and now I do this for this and for that.”

So, yeah, there is a lot of things that we can do with technology and sound that we are still far behind in that regard. We need much more work to be done in sound for picture to be able to get even better results.

[00:35:37 Martin]: Given your expertise with the software, do you ever get producers coming to you and say we want you to do the sound design?

[00:35:43 Nuno]: No, actually, I think that I think I'm much better creating audio software than being an average or below average kind of sound designer. Nonetheless, what sometimes happens to us is, we have people approaching us because they want to do more complex things or they are missing something that is lacking in the market in terms of audio software.

“I would like to do this or that kind of things, but there is no tool to do that. Could you be interested in coming with something?”

And sometimes we do some prototypes, sometimes we do these small custom-made softwares just to help them with that particular case. Or in some cases, even sound designers or supervising sound editor’s approach:

“Okay, my director wants to do something completely out of this world in terms of sound. Do you have ideas that could be interesting?”

And we always have a lot of interesting ideas to use them over this. But essentially it's a fantastic journey working on this area, being able to meet these people, having our software being used in these huge productions. For instance, for someone like me that loves cinema, going to the studios, going to Skywalker, walking through the corridors of Disney or Pixar, meeting these fantastic people. For instance, I recall a few years ago we were nominated for an award in LA and on the same ceremony Spielberg was receiving his career award. So, there I am two meters away from Spielberg and Bradley Cooper. And the interesting thing is not a matter of:

“Oh, they are famous people.”

But it's a matter of... You feel integrated, you feel that I'm also part of this community of professionals that do their work to help cinema and the movies that everyone loves. And this feeling of belonging to the movie community, it's quite rewarding.

[00:37:49 Martin]: In terms of competition, is it patented software? Or is there a risk that someone else could say:

“Oh, we'll use particle technology and take away part of your market share.”

Presumably there can always be competition in this kind of area.

[00:38:02 Nuno]: Yeah, so actually we continue without having a direct competition in this kind of the software, with this completely CGI particles, 3D kind of approach. And that is good. I'm sure that it's only a matter of some time, it could be one week, it could be 10 years that real people will arrive with different kind of approaches.

Nonetheless, the kind of work that you need to reach the point where we are, it's highly complex because something like Sound Particles, I can tell you that has millions of lines of code, we are talking about 1.000 files of code. So, actually, anyone that starts now having an idea:

“Okay, let's do something like Sound Particles”

Yes, they will probably be able to do it, but it’s a very complex process because we have been doing that for more than 10 years now. So they will need to work very hard and very fast to come up with the same level of features like we have nowadays. Nonetheless, it's a possibility. And what we try to do is to continue innovating ourselves more and more. And by doing that, we make sure that we are ahead of any competition that may eventually arrive one of those days.

[00:39:25 Martin]: And although you’re based in Portugal, today in the digital world, it's very easy to communicate worldwide, to keep in touch. Do you feel there's any disadvantage of being so far away from Hollywood or Paris or London, the big bases of production, or everything runs really smoothly?

[00:39:39 Nuno]: No, I have to say that I was very surprised on how easy it was to reach these professionals because when you think about Hollywood, you think about this closed community, your name needs to be on the list of approved people to enter the studios that day, you know, passport control, x-rays, those kinds of things. But actually, for me, it was, okay, I send a few emails. Of course, I didn't send the emails to info@universalstudios. I made some homework to know exactly which professionals should be the ones that I actually wanted to contact.

But in most of those cases, it was simply sending an email saying:

“Okay, I'm doing this. I'm going to be in town.”

And most of the times they simply replied:

“Okay, great, pass by.”

And I think one interesting thing, Americans may have many flaws, but one thing that I really appreciate is that they don't care where you come from. If you are coming from Portugal, if you are coming from Silicon Valley. If you have something that eventually could be interesting for them, they are open to give you five or 10 minutes just to get to know what are you doing and if that could be interesting. For instance, as Europeans, sometimes we are a little more snobs, and sometimes you look first at the curriculum of someone before accepting to have a meeting or something like that. So, they are very open-minded and especially the sound community, it's not the kind of ego, nobody goes to a sound designer because he has a big, big ego. They would go for different roles in the movie industry. So, it was quite easy.

And then the other part is that, most of the times I went there and said:

“Okay, I came from Portugal in Europe.”

And they say:

“Yeah, I love Lisbon. I go there a lot of times. I love the food.”

I think:

“Okay, they will not even know where Portugal is.”

But the reality is that most of them already went to Portugal or they want to come to Portugal on the next vacations. And the conversation starts to flow very easily with them. For instance, at some point I was in LA waiting for the transfer to the airport to go to return to Portugal and the flight did a scale in London. And I was in the hotel waiting for the transfer and I thought:

“Okay, let me see studios in London.”

And I said:

“Okay, Pinewood is actually close to the airport, let me send an email.”

And I send an email saying:

“I'm doing this, I'm actually returning to Portugal, but doing a scale tomorrow there in London. If you are curious, I may pass by and talk a little more about our technology.”

And I sent the email, 10 minutes later I get the reply:

“Yes, come here tomorrow, it'd wonderful to get to know more about your technology.”

And that's pretty much the kind of things that happen, at least with me. Once again, I'm pretty sure people working with other fields, with directors or actors, or something like that, and producers, will not have an easy path like this. But for me, it was very easy to reach this fantastic professionals, a lot of them with a lot of Oscars in their shelves, but they are fantastic people, very approachable that are there and open to talk with you and know more about your technology. And if the technology is really interesting, great, they go to the next level and start using them. So, my experience was quite rewarding.

[00:43:14 Martin]: You said you've got a total around 25 people in the team and there's a big emphasis on research and development. Which is great. Looking towards the future, you presumably are constantly updating the software, you're doing these more bespoke applications for specific films. If you've got anything being developed, probably you won't want to talk about it directly, but in general terms, what are the main challenges you can see ahead?

[00:43:36 Nuno]: Essentially, I can mention two things. One of them is something that we have actually been working for the last four years, because pretty much the entire entertainment industry is now adopting spatial audio, because it gives a feeling and experience that is much better, both in movies, of course, but even in streaming. For instance, Netflix uses Dolby Atmos even in food-related programs, so it's not only about big epic movies. Even regular TV is using special audio, of course, video games and music.

But the problem is that most people don't have this number of speakers in their living rooms. They don't have 10 or 12 speakers on the living rooms. And people use headphones even to watch movies. So, what we have been doing over the last four years is to create our own technology of 3D sound over headphones, allowing people to have regular headphones, but still be able to perceive sound that's coming from every single direction. There are a few technologies already on the market that do this, but they don't work very well. The main problem is that each person has a different kind of ear. And if you want to fool the brain using headphones, you really need to know the shape of the ear of every single person, to know what is the kind of acoustic

signature that person needs, for you to replicate or fool the brain that the sound comes from a particular direction.

And this is a highly complex problem. More than 100 PhDs were done on this topic. It's something that involves computer vision, math and physics, very difficult things… artificial intelligence and much more. So, we have been doing this and we are pretty much on the verge of releasing the first prototype on the upcoming months. That will allow for instance, streaming and many other kind of solutions to allow people to have headphones, but get a sound coming from everywhere.

On the other front, in terms of the creative front, what we are doing is pretty much trying to do with sound the same thing, the same revolution, that computer graphics has done with image. So computer graphics was probably the biggest revolution happening in the movie industry in terms of technology over the last 50 years. It changed the way that you do animation, the way that you do visual effects and all of those things.

What we now need to do is to almost bring the same kind of approach to sound. So, if we are doing a dinosaur and we create the bones and the muscles and make the textures and make sure that when we animate the thing, everything goes smooth and perfectly. Why not to do the same thing with sound? Why can't we simply model the vocal tract of a dinosaur and try to get the sounds exactly like it should be? If I'm using CGI for animation, why not to use that information and have sound controlled by the CGI? We have this kind of approach also with sound.

So, there are a lot of things that we want to continue exploring on the upcoming years in terms of technology. Yes, I usually tell people that I could have a team of 500 developers that I will have more work enough to feed all of them. We have this kind of vision for the future of post-production, audio post-production. And the idea is to continue this road and try to create software that allow you to create fantastic things using this CGI kind of approach, but for sound.

[00:47:07 Martin]: We were talking about artificial intelligence, which is also a bit of a buzzword because we can use that word for more or less anything. But in terms of image technology, there's lots of applications going on at the moment. You can put something in words, and it will create images and so on. Are there also similar applications in sound? To what extent is that relevant for what you're doing?

[00:47:28 Nuno]: So currently there is several applications in AI, especially in terms of things like recreating the voice of actors that died. For instance, the Princess Leia on the last *Star Wars* was recreated after her passing away.

So, you can do a lot of things in that regard. Also, there is a lot of AI being done, especially making the recordings more clean, removing the background noises, those kinds of things like RX from iZotope, it's a well-known kind of tool. In our case, like I mentioned, we have the know-how in terms of artificial intelligence. We are using it a lot for this 3D sound over headphones technology.

Regarding creative tools, there are a few things that… First, I'm not very interested on following the idea of using AI to replace sound professionals, because I think it's not going to be a very good result in the end. But what I'm interested is in eventually use AI to do much more interesting things. And imagine something like Sound Particles being controlled by AI or some other kind of approach where actually you can use AI, but in a way that helps the sound designer, instead of replacing the sound designer. So, analyzing the picture and knowing how to track the

sounds around, because mixers really hate to do that. And they spend hours and hours simply tracking every single sound where it is. And they want to focus on more creative artistic part of the things. So, artificial intelligence can actually help them, automate this kind of boring tasks that they need to do and allowing them to have more work, more time, to spend on the creative side.

[00:49:20 Martin]: The main focus of your business has been film and TV, but with software like 3D software for headphones, presumably that opens up to the music industry, to tech, to YouTube, to video gaming. Presumably this will broaden your application. It will no longer be just film and TV. Is that right?

[00:49:37 Nuno]: Originally, we start with the movie industry. Then at some point, we start to have some TV productions using our technology, things like *Game of Thrones*, *Stranger Things*, *Rings of Power*, those kinds of productions. Also, at some point, we have video games' companies start using our technology, things like PlayStation, Blizzard, Ubisoft, and others that pretty much want to recreate this kind of Hollywood sound.

And then, at some point, we start creating some plugins like small audio software for the music industry. And we released this year a 3D synthesizer, which means it's a musical instrument by software, but actually working with 3D so you can play a note and get sound in 3D and it's quite interesting. But I would say that we're born on the movie industry. Yes, we are getting to much more entertainment areas like TV, video games and music. But I must say that movies are still in a special place in my heart.

[00:50:43 Martin]: And some of the bigger productions that have shot in Portugal using the Cash Rebate scheme, are there any of these productions that have used the software?

[00:50:50 Nuno]: No, I'm not aware of exactly which productions have used the software, because sometimes we don't even know the production. Because we sell the software to some user, but he doesn't need to tell us exactly where he uses the software. Sometimes what you find out is even one or two years later, the fact that we have met someone…

For instance, in April I was in an event in LA. At some point, the composer from *Avatar 2* approached me and said:

"Oh, yeah, I used Sound Particles on *Avatar* soundtrack."

And so sometimes we only end up knowing while having this kind of conversations with professionals in the industry. In this case of the productions that were shot in Portugal, I don't know exactly which one of them have used Sound Particles, but it's always an interesting fact for me to do research and find out if they are actually using Sound Particles also or not.

[00:51:48 Martin]: Do you kind of feel that Portugal has got a bigger visibility now?

[00:51:51 Nuno]: Yeah, in many levels. Of course, we already knew that Portugal has the weather conditions pretty much like LA, which is great. We are not an English-speaking country, but the English literacy in Portugal is quite high. So, it could be a very interesting place for productions to be shot. But especially nowadays, when people start to fall in love with Portugal. For instance, I can tell you more than 20 people in the industry that are telling me that they are considering moving to Portugal or they are going to move to Portugal. So, a lot of people are coming to Portugal because they like the conditions of the country, it's peaceful and you have this fantastic weather, food, wine, and many other things. And it is not only good for shooting, but now people

are starting to be in love with the country. And by doing that, of course, more easily, they approach Portugal to do the shooting, the movies, because we have the right conditions for that.

[00:53:01 Martin]: That's great Nuno. I'm a big fan of sound design myself, so it was a great pleasure and an honor to be able to talk with you.

[00:53:07 Nuno]: It was a pleasure to meet you, Martin.

[00:53:09 Martin]: So that was the episode dedicated to Sound Particles and the future of sound design with Nuno Fonseca. That's the end of this episode of the podcast “Filming in Portugal. See the big picture” of the Portugal Film Commission. Thanks ever so much for your time Nuno.

[00:53:22 Nuno]: It was a pleasure.