**DIO GONZALEZ**: (VOICEOVER) And so they made us draw lines, not even curved lines, it was just straight lines. And they explained us how to do it. Like, you find the formula, then you program it, and then tah-dah, lines. (Laughter.)

And that was like my -- like "ah-hah" moment and my mind exploded….

But that part, when we were able to draw pictures, that's when I'm like, "That's it, I'm in."

**[MUSIC]**

**KEVIN SCOTT:** Hi, everyone. Welcome to *Behind the Tech*. I'm your host, Kevin Scott, Chief Technology Officer for Microsoft.

In this podcast, we're going to get behind the tech. We'll talk with some of the people who have made our modern tech world possible and understand what motivated them to create what they did. So join me to maybe learn a little bit about the history of computing and get a few behind-the-scenes insights into what's happening today. Stick around.

**[MUSIC]**

**CHRISTINA WARREN:** Hello, and welcome to the show. I'm Christina Warren, senior cloud developer advocate at Microsoft.

**KEVIN SCOTT:** And I'm Kevin Scott. Today, we'll be talking with Dio Gonzalez.

**KEVIN SCOTT:** Dio is so inspiring, -- there's here technical work on virtual and mixed reality, which I think is really amazing and it's this whole element of constantly working to build tools to help people unlock their creativity.

**DIO GONZALEZ:** And she's also a mentor and an advocate for girls and women in tech.

**KEVIN SCOTT:** Yeah, so much great work and such an inspiring person. She has this amazing story, like so many of the folks that we chat with here on the podcast. So, let's talk to Dio and find out what's she's been up to.

**[MUSIC]**

**KEVIN SCOTT**: All right, coming up next, Dio Gonzalez. Dio is originally from Venezuela. She attended Purdue University, where she helped to set up its first virtual reality facility. She's worked in the animation industry at Pixar and DreamWorks Animation. She also worked for Unity Labs, before joining Microsoft in December 2017 as a principal software architect in Central Engineering. Welcome, Dio.

**DIO GONZALEZ:** Hi, thank you.

**KEVIN SCOTT:** So, you and I met a few years ago at –

**DIO GONZALEZ:** I know. (Laughter.)

**KEVIN SCOTT:** -- at Grace Hopper. I actually took your portrait for this site that I do also called *Behind the Tech*.

**DIO GONZALEZ:** Yes. I know. Can you believe that I almost like -- I hadn't done that connection when I joined Microsoft, and it took me like a while. Oh, yeah, that's true. I've met Kevin before. (Laughter.)

**KEVIN SCOTT:** Yeah. And it was sort of the same thing with me. In my mind, you were still a principal engineer at Unity. And I'm, like, "What? She works for Microsoft now?"

**DIO GONZALEZ:** I know.

**KEVIN SCOTT:** So, we're super excited to have you here at Microsoft and to have you on the podcast today.

So, I'd love to start with you and your story. You're from Venezuela, right?

**DIO GONZALEZ:** Venezuela, yes.

**KEVIN SCOTT:** And so how did you get into computer science technology in the first place?

**DIO GONZALEZ:** Yeah. Yeah, I have my story, which is that was in sixth grade in 1987, a long time ago.

So, they didn't have computer science in the school, but somehow they had a company that was giving her classes in computer science, like pitch this to the school and the school is like, "Okay, whoever wants to and, you know, can afford it and all, well, you can sign up for this computers class after school."

So, I signed up. I'm, like, okay, yeah, let me check it out, let me know. And so it was with those -- I guess it was the Macintosh II, those old Apples.

**KEVIN SCOTT:** Oh, very nice. (Laughter.) Yeah, that was probably my very first exposure to a computer as well.

**DIO GONZALEZ:** Ah-hah. So that was the very first time. I didn't have a computer at home, I had never seen one.

**KEVIN SCOTT:** Oh, nice.

**DIO GONZALEZ:** So, yes, yes. And the thing is the very last class was about this concept of pixels. And so they made us draw lines, not even curved lines, it was just straight lines. And they explained us how to do it. Like, you find the formula, then you program it, and then tah-dah, lines. (Laughter.)

And that was like my -- like "ah-hah" moment and my mind exploded. I was, like, yeah, like --it was like fascinating for me like you can like a formula translated into a picture? That's like that's just like unbelievable, like, until then it was, like, yeah, computers are cool, you know, very fancy calculators, right?

But that part, when we were able to draw pictures, that's when I'm like, "That's it, I'm in." And so ever since then, I was like, I'm going to be a programmer and I'm going to do something related to putting pictures on the screen.

**KEVIN SCOTT:** That's awesome. I've always wondered how many kids have that experience because for me, it was sort of similar. Like, I grew up right when console arcade games had started to come out. So, like the sort of Space Invaders and Asteroids like the -- like the Vector Graphics things.

And they were so engaging and I was so curious about how it was that you made something like that, that that was my attraction to computers.

**DIO GONZALEZ:** Right?

**KEVIN SCOTT:** It's like this gravitational field that sucked me in. And so it was similar to yours. And I just wonder -- I've always wondered how many kids get pulled in that way, because like they use some piece of software, like you know, they get their imagination sparked by this visual thing and then --

**DIO GONZALEZ:** Yes, exactly --

**KEVIN SCOTT:** -- and then all of a sudden like they're down in the guts of the computer. (Laughter.)

**DIO GONZALEZ:** Yes, exactly. I think that's what like many of us have had is when it's like, my goodness, my imagination, my creativity, I can do so much with this.

**KEVIN SCOTT:** Yeah.

**DIO GONZALEZ:** And also that part of like something that is just, yeah, numbers, bits, okay, whatever, you know? You know? Wires, then you see, like, whoa, look at what this created.

**KEVIN SCOTT:** Yeah, but it's sort of like all of the bits and the wires and the numbers are a means to the creative end, right?

**DIO GONZALEZ:** Uh-huh, a means to -- exactly.

**KEVIN SCOTT:** Yeah, that's awesome.

**DIO GONZALEZ:** Yes. So, ever since then, I'm like, okay, I'm going to be a computer programmer…

**KEVIN SCOTT:** So, at some point, you had to make what must have been a huge decision to leave Venezuela and come to the United States to study computer science.

**DIO GONZALEZ:** Yeah.

**KEVIN SCOTT:** Like, how did you make that decision?

**DIO GONZALEZ:** Yeah, well, again, I wanted to do computer graphics. (Laughter.)

**KEVIN SCOTT:** Yeah.

**DIO GONZALEZ:** So, in Venezuela, undergrad is actually five years mandatory. So, the last year, and you had to write a thesis and all.

Last year, they ask you -- you are required to select two areas of specialization. And for me, of course, was computer graphics. So, I'm like, yeah!

So, that was the years when Opengl had just started, it was like brand new. And you would get those CDs, you know? These are the Opengl drivers, install this, these are the good ones. So that's -- that's -- (Laughter.)

And so --

**KEVIN SCOTT:** Good times.

**DIO GONZALEZ:** I know. (Laughter.) Yeah. So, I wanted to do computer graphics. So, I had already done my one year in undergrad. My thesis was about, you know, doing interactive storytelling and I had programmed some kids' you know stories.

So, unfortunately, in Venezuela, the computer graphics industry was minimum.And then there were no graduate programs~~.~~

And so I worked several years saving money. And then, yeah, I apply -- I apply for a school here, Purdue University, and so was super lucky that, yeah, I got accepted and all.

**KEVIN SCOTT:** And so you -- after Purdue, you wound up teaching games programming in Singapore?

**DIO GONZALEZ:** Yes.

**KEVIN SCOTT:** How did that happen?

**DIO GONZALEZ:** Yeah, yeah, because you know, my master's degree was in virtual reality. So, that was my whole job -- my whole work, research, and my thesis. At that time, there was no Oculus, right, no Vive, no Windows Mixed Reality, no Unity, so there was not really industry in virtual reality, just a very few startups.

So, you had to stay in academia to do that. And so that was the years after 9/11 where it was still very tough to be an international student in the U.S.

**KEVIN SCOTT:** Yeah.

**DIO GONZALEZ:** So, even with a legal visa and all authorized to work, it was really difficult. Companies would not hire international students. So, I just send my -- I put a website and sent my resume pretty much everywhere. I saw it like everywhere.

And they called me from Singapore. And I'm like, "Sure." (Laughter.)

**KEVIN SCOTT:** Oh, what an adventure. (Laughter.)

**DIO GONZALEZ:** They flew me for the interview and they interviewed me. Then I came back to the U.S. and then they offered me the job. And so, yeah, I went. So that -- what I loved about that is, again, I wanted, again, to perhaps do a PhD or continue again in virtual reality, right? That's what the whole idea.

So I was there, yeah, and the digital media school teaching games programming and I specialized myself there in 3D worlds because that was the time with Second Life, you know, and this thing about 3D worlds and virtual worlds was starting.

So, I became that person over there.

**KEVIN SCOTT:** And did you enjoy teaching?

**DIO GONZALEZ:** Yes. However, after two years, I realized -- because I met colleagues that are really teachers at heart. They're like amazing teachers and I admire them. But I realized what I'm really enjoying is geeking out and talking about things that I love and then having a conversation.

**DIO GONZALEZ:** And so that's when I decided like I -- that's when I quit and I became just a full-time researcher and stopped teaching, yeah.

**KEVIN SCOTT:** Like there are just so many things that you could have chosen and, like, virtual reality is, you know, like, at the time that you chose it, was really at its sort of early stages of development. There weren't, like, all of these VR things that we're all excited about now.

**DIO GONZALEZ:** Yeah. Yeah. I was just like super lucky because I was at Purdue I'm like, okay, again, I knew I wanted to do computer graphics. And, of course, Pixar and that was like inspiration.

And so I was just looking around, meeting professors, and then I found out a friend of mine told me, he's like you know that they are building for the first time a virtual reality center at Purdue? And I'm like, really?

So I went there, they were just like literally putting bricks in there. And so I went and talked to the professor and like, "Hey, I'm looking for a thesis, can I just talk to you and see?"

And then the professor that was there in charge of that, they hired her, she had to finish her PhD and was in charge of building and running the center.

I met with her, and then she starts telling me that, yeah, yeah, we do here, you know, virtual reality and all. Do you can, you know, because I started with her, you know, Carolina Cruz-Neira. And I was like, my God, yes! Because I knew Carolina Cruz-Neira is a Venezuelan-American, she has three nationalities, American, Spanish, and Venezuelan.

She grew up in Venezuela. She has a computer engineering degree from Venezuela, and she is a pioneer in virtual reality in that she invented the CAVE projection-based --

**KEVIN SCOTT:** Oh, wow.

**DIO GONZALEZ:** -- virtual reality.

**KEVIN SCOTT:** Oh, that's awesome.

**DIO GONZALEZ:** Right now, she's been running her own centers now, now she's in Arkansas running her own virtual reality center, yeah.

And so my eyes were, like, oh, my God. She's, like, oh, yeah, I worked with her. And I got excited because in my computer graphics classes in Venezuela, they had told us about her. It's like, hey, this is a Venezuelan, she invented the CAVE.

You know, and so I'm like, can I work for you? (Laughter.) She also saw that I was excited and so she hired me.

**KEVIN SCOTT:** Oh, that's fantastic.

**DIO GONZALEZ:** And so that's how I got into virtual reality. And so now Carolina, I call her my "academic grand mommy." And it's funny because when I saw her -- when I see her, she's, like, hey, grand mommy. (Laughter.)

**KEVIN SCOTT:** So, at some point, you made the jump to working in industry. So, you were a character animation engineer at Pixar.

**DIO GONZALEZ:** Yes.

**KEVIN SCOTT:** So, tell me a little bit about that. That must -- I could imagine that must have been a super cool job.

**DIO GONZALEZ:** Yes. That was amazing. Amazing. I worked first actually at DreamWorks Animation.

**KEVIN SCOTT:** Oh, cool.

**DIO GONZALEZ:** I was there for almost five years. I had to apply three times because I messed up, of course, like everybody. Right? So the third time, they accepted me. And so I was a character animation engineer.

**KEVIN SCOTT:** Awesome.

**DIO GONZALEZ:** And --

**KEVIN SCOTT:** And so what does that mean? Like, what does a character animation engineer do?

**DIO GONZALEZ:** Yeah, we write the software that -- you know the super-popular animation software packages in the industry, Maya, 3D Studio, Blender, which is open source?

**KEVIN SCOTT:** Yes.

**DIO GONZALEZ:** So, the studios write their proprietary one. They don't buy that. So, we were the engineers that write that software in there in the studio.

And then my clients, my users were the -- specifically, because I was doing character animation. My clients were the character TDs as well that these are character technical directors that are the in between that then they set up all the tools that were, you know, for the animators.

**KEVIN SCOTT:** Right.

**DIO GONZALEZ:** So, we serve both, the animators for the interface, but the character to these -- (inaudible, crosstalk)

**KEVIN SCOTT:** And so you would do special things for those technical directors?

**DIO GONZALEZ:** Yes. Yes.

**KEVIN SCOTT:** If they say, like, "I need to model hair in this particular way for --

**DIO GONZALEZ:** Correct.

**KEVIN SCOTT:** -- this panda.

**DIO GONZALEZ:** Yes. So, they would say, "I need this specific controls," so it's -- I loved it, by the way, I can talk about that forever.

So, you know what? The way that a character works in animation, I'm going to simplify it. It's with a rig. So, a rig is a dependency graph, right?

**KEVIN SCOTT:** Uh-huh. (Affirmative.)

**DIO GONZALEZ:** And so you have nodes and (inaudible) evaluate those nodes. And so the character TDs are the ones that write those nodes and connect them the way the character you know the panda, the dragon, et cetera, can move or can have the freedom of movement that the animators want. And so we, the engineers, had to provide that way for the character TDs to enable that.

**KEVIN SCOTT:** Right.

**DIO GONZALEZ:** So what we did a lot of this writing this library right of this dependency graph, evaluation -- evaluation library, which actually is called LibEE and it actually won an Academy Technology Award.

**KEVIN SCOTT:** Wow.

**DIO GONZALEZ:** Yeah. Yeah. Yeah. Last year. And so we wrote that core. So, and then of course write the whole software on top of it to then have the animators and the riggers do that.

**KEVIN SCOTT:** Is there any -- are there any interesting characters in particular that you worked on?

**DIO GONZALEZ:** Yes. Yes. Because the movie that -- because that was, at that time, by the way, this was -- all of the studios -- because Pixar was doing the same, and when I worked at Pixar, by the way, I worked on the similar, you know, their equivalent, which is they were rewriting all of the software because the legacy one didn't take advantage of GPUs, right?

**KEVIN SCOTT:** Right.

**DIO GONZALEZ:** In their computers these days, so that's why we wrote everything from scratch. So that's why I'm super proud. The very first movie that completely used the software is *How to Train Your Dragon 2*.

**KEVIN SCOTT:** Nice.

**DIO GONZALEZ:** So, that's the movie --

**KEVIN SCOTT:** Which is an amazing movie.

**DIO GONZALEZ:** Yes. That's the movie that like is super close to my heart and I love it. And so, again, because I'm the engineer and I know how it was done, like I admire because I see things that, you know, your regular viewer doesn't see.

And I know -- they don't need to appreciate it, but I do. Like, when I see the scenes with like hundreds of dragons, you know how hard that is? Like, over 100 rigs, film quality. And you know how many nodes? Those are millions of nodes in our dependency library, right?

**KEVIN SCOTT:** Yeah.

**DIO GONZALEZ:** And in our library that have to be evaluated and then you know sent and animated, so I'm really proud of that.

**KEVIN SCOTT:** That's awesome. You should be proud of it.

**DIO GONZALEZ:** Yes. Yes.

**KEVIN SCOTT:** I'm, it's a -- it's always interesting to me this being able to effectively bridge the gap between this very technical world, because computer graphics, like all the way at the bottom of it is like one of the more technical things in computer science and engineering.

And then there's this brilliant creative part of building these animated films. And if you don't get both right, you really don't have like this compelling product in the end.

**DIO GONZALEZ:** Yes, exactly.

**KEVIN SCOTT:** You know, sort of like emotion without good technology, your vision is just sort of constrained in all of these ways.

And like the technology without the emotion and the storytelling is just sort of bland and falls flat.

**DIO GONZALEZ:** Yes. Exactly, like I remember -- you know, so the tools that we give to the character, these are scripting tools.

So, we write of course everything in C++, you know, the library. And then we create bindings for any scripted language that then the character TDs would use. So I was that one. I was the Python binding girl.

**KEVIN SCOTT:** Very nice.

**DIO GONZALEZ:** Yeah, in the animation R&D team. And so that -- I went through that -- like the very first solution that we had was some commands there like the TDs would have to create, you know, their nodes and everything. And I do remember them saying, "This is hard," the very first one. This is like so limited, like, I cannot do this. And, you know, their evaluation nodes and blah, blah, blah. So I had to do -- we had to do a lot of iteration of that.

**KEVIN SCOTT:** Oh, that's fascinating.

(Crosstalk.)

**KEVIN SCOTT:** So, the TDs would actually code in Python?

**DIO GONZALEZ:** Yes, yes, that's one thing that not many people know, the TDs are quite technical people in the animation industry. They're programmers with a lot of creativity because they know the -- they know about lighting and animation and all, but they're coders, pretty much.

**KEVIN SCOTT:** Super, super interesting. So, at some point, you started working for Unity and like you were explicitly working on virtual reality there?

**DIO GONZALEZ:** Correct.

**KEVIN SCOTT:** So, tell us a little bit about that.

**DIO GONZALEZ:** Yes. So, what I worked was -- it's called Unity Labs. They are the branch of Unity that does experimentation. So, this is not the team -- they have an R&D team that are the ones in charge of building and creating the editor and releasing it. So, Unity Labs was about experimentation and seeing what new things we can do.

So, I started first in the VR team. And so, of course, being Unity, our focus there was how do we enable creators to really, you know, just unleash their imagination? Because I mean, that's why I admire Unity, it's amazing what they've done and that's their mission like democratized -- they were the ones that said at first "democratizing," right, development.

And they've done it like so of course and it's really true to their heart. So, that's why we -- what we were doing first at Unity Labs.

**KEVIN SCOTT:** Yeah, it's really amazing. I -- a few years ago, I decided that I wanted to write a game.

And I hadn't done game programming in 20 years. And so the entry point for me was Unity. I downloaded the SDK and like read through the docs and like I wrote a little mobile game in no time flat.

**DIO GONZALEZ:** Yeah, in a couple of hours, right?

**KEVIN SCOTT:** Yeah. And that, to me, was shocking because what I remember from 20 years ago, it was not that easy.

**DIO GONZALEZ:** Yeah, like, when I was doing my master's, right, I was programming in C++ and all -- moving the camera in Opengl and everything. And, you know, typically you're like -- you create your scene and the scene graph, you have to create it by hand.

**KEVIN SCOTT:** Yeah.

**DIO GONZALEZ:** There were scene libraries, but still, you have to create every node and program and connect them.

**KEVIN SCOTT:** Yeah.

**DIO GONZALEZ:** And then move the camera. And I remember the problem that everybody had, which is first you created your scene, and then you put the camera -- okay, run, and it's black. Like, what? It's because the camera is normally pointing like the wrong way. So you have to like really do the math.

Okay, if the object is here, you have to do the math of where the camera is, how do I -- should I rotate it and all?

**KEVIN SCOTT:** Yeah, it always struck me as like when I was trying to do that sort of stuff that it was a flavor of creativity that the tools were so low level, it struck me that it was probably the same as if you'd told a painter that, like, they had to make a, you know, like a five-foot-by-five-foot, you know, canvas painting, but they were only allowed to do it like one square inch at a time, without being able to see anything else.

**DIO GONZALEZ:** Ah! Exactly.

**KEVIN SCOTT:** Like, it's just so hard. And, like, it -- it's --

**DIO GONZALEZ:** Yeah.

**KEVIN SCOTT:** -- so much easier now.

**DIO GONZALEZ:** Uh-huh. (Affirmative.) Yeah. That's -- that's what I'm -- these -- this tool's amazing. Like, my thesis was a networking library and scene synchronization, which you don't need to write that today, right?

**KEVIN SCOTT:** Yeah.

**DIO GONZALEZ:** Because the software does it for you. So, now people can think beyond that, right? So, yes, that's amazing what these tools have done.

**KEVIN SCOTT:** And so like maybe we should talk a little bit like we have people listening from all different parts of computer science and folks who aren't computer scientists. So, like, what is virtual reality?

**DIO GONZALEZ:** Oh, okay, yes. So, because I come from the academic world, I normally give the academic kind of definition.

So the definition is a virtual environment is a 3D world, 3D, created by a computer. And it has to meet the conditions of being in stereo, so that's one, like the user experience it in stereo visual or audio, right, and it has to be user perspective centric.

And that means tracking. So, when you move, the perspective of the world moves accordingly updating to you, so every time you move and all that, you see it from that point of view. So that's the other --

**KEVIN SCOTT:** Right. And all of that is intended so that, like, when you're in this virtual environment, it is intended to be immersive.

**DIO GONZALEZ:** Correct. Exactly. Exactly. So, a friend of mine, I like using his metaphor, which is virtual reality is like reading a book. You get lost in it. You just open it and you're -- you're totally disconnected from your current reality, you get in it, right? And that's what virtual reality is, it's something (inaudible) into something totally different.

Mixed reality, augmented reality, on the other side, is then when you're like still anchored in reality and then you bring additional elements.

**KEVIN SCOTT:** Right. And mixed reality is what you've been working on here for the past couple years, right?

**DIO GONZALEZ:** Yes. Yes. Yes. I started at Unity, actually --

**KEVIN SCOTT:** Oh, really?

**DIO GONZALEZ:** I'm super proud that my second year at Unity, my designer and I, both of us were, like, okay, yes, we did virtual reality, but you know what? We really need to do mixed reality, that's it. That's it. So the two of us were, like, okay, done. We just created the mixed reality research group at Unity.

**KEVIN SCOTT:** I -- (Laughter.)

**DIO GONZALEZ:** So we just created it. And then came here.

**KEVIN SCOTT:** And so what sparked that excitement for you? Like, why do you think mixed reality is interesting?

**DIO GONZALEZ:** I believe that mixed reality is the one that has the potential to really affect our daily lives, our day-to-day lives. Because it's going to be integrated into everything that we do.

**KEVIN SCOTT:** What -- what's an example?

**DIO GONZALEZ:** So, I have several examples. And what I always think is the best ones are the ones that are useful for us. So, I was saying, "Oh, yes," yesterday, in talking with one of the researchers here, I was -- I was telling him that one of my dream uses of mixed reality is for, you know, it happens a lot -- in computer graphics, and I many fields that people are very visual.

And they see things in their head, but it's hard to explain, right? Many of us that are visual, it's like, "Oh, I can see it, but it's hard to explain."

So, one of my dream scenarios for mixed reality is that is being able to just immediately translate your thoughts into -- and just to like swipe from your brain to in front the person that you're talking to, and then your visualization immediately comes in front of them.

So that is something that is useful, you see what I mean?

**KEVIN SCOTT:** Right.

**DIO GONZALEZ:** So, that's -- the other education of course -- because I went through that. You know when we're like math in college?

**KEVIN SCOTT:** Uh-huh. (Affirmative.)

**DIO GONZALEZ:** So that when we learn parametric surfaces, you know, and volumes, those are really hard, right?

**KEVIN SCOTT:** Yeah.

**DIO GONZALEZ:** And explaining that in a whiteboard was always tough. Like I remember my professor with like different colors of markers and trying. That's a perfect scenario for mixed reality.

**KEVIN SCOTT:** Yeah.

**DIO GONZALEZ:** Right? The professor actually creating it and then everybody -- all of the students seeing the volume, the surfaces in front of them.

**KEVIN SCOTT:** Yeah. One of the things that surprised me about mixed reality after I came to Microsoft and started seeing how our customers were using the HoloLens and mixed reality software was that there were these whole audiences of people who, in their work, didn't even use computers normally, but all of a sudden like you give them a HoloLens and like that becomes their first computing device in the workplace.

**DIO GONZALEZ:** I know.

**KEVIN SCOTT:** So, folks who do maintenance, for instance, like there are all of these applications where you can put on a HoloLens and it sort of superimposes this mixed reality view on top of the thing, like whether it's a pipe or an elevator or like a complicated piece of machinery that you're doing maintenance on.

And you can pull up the manuals, like you can superimpose sort of visual representations of the performance of the thing, like metrics --

**DIO GONZALEZ:** Yeah, or instructions of how to fix it and all.

**KEVIN SCOTT:** Correct. And you can even like use like your communication tools while you're looking at the thing to like call someone from you know like technical support or an engineer to help you debug the thing that you're trying to fix.

**DIO GONZALEZ:** Yeah, right, and --

(Crosstalk.)

**KEVIN SCOTT:** And it becomes this incredibly powerful tool.

**DIO GONZALEZ:** Yeah. And then the expert actually doing annotations, 3D annotations to then help the person on site fix and everything. That's they what brought me here to Microsoft, because that's brilliant.

**KEVIN SCOTT:** Yeah.

**DIO GONZALEZ:** That's what I -- what I mean about mixed reality becoming part of our lives. Games and entertainment are awesome and always needed, right?

And the storyteller in me, you know, from the animation industry will always be there. But a huge impact is when it's that and when it's just become part of our lives. And, yeah, that's amazing. And in the enterprise sector it's like a perfect one right now to start.

**KEVIN SCOTT:** Yeah, it's super cool. It reminds me a little bit of the *Hitchhiker's Guide to the Galaxy*, like, I don't know if you've read those Douglas Adam books, but the book mostly wasn't about the actual Hitchhiker's Guide, you know, it was about the adventures that people had in this sort of crazy universe. But, like they had this thing called the *Hitchhiker's Guide to the Galaxy*, which was, effectively, a mixed reality application --

**DIO GONZALEZ:** Yeah.

**KEVIN SCOTT:** -- like, it was this thing that had all these annotations about where you were at and mostly comical senses. But, yeah, no, I'm always reminded of that whenever I'm thinking about MR.

**DIO GONZALEZ:** Yeah.

**KEVIN SCOTT:** So, you know, let's change gears for a second. So, you've -- you had this really interesting experience growing up, like you know where you went to school and like some of these experiences like helped you have this determination and grit into getting into the field.

**DIO GONZALEZ:** Yes, I always knew that I was going to be a programmer and a computer engineer. And the funny thing, by the way, you know those standardized tests that they do to you at the end of high school to help you?

**KEVIN SCOTT:** Yeah.

**DIO GONZALEZ:** So, of course I did it, right? Every school. And my tests were terrible for engineering. (Laughter.) Yes, were bad. And so I remember like reading it and like, "Whatever, I already know I'm going to be a programmer."

**KEVIN SCOTT:** That's so awesome.

**DIO GONZALEZ:** Right? And so I go to the session -- I think I didn't even tell my parents because I don't remember having that conversation because my arrogant, you know, teenage mind was, like, "No, I'm going to be a programmer, come on." (Laughter.)

**KEVIN SCOTT:** I don't think that's arrogance, that's determination. (Laughter.)

**DIO GONZALEZ:** I don't need anybody to tell me so. I go to the session with the psychologist like, you know, she's like a counselor. And so she's, like, okay -- because their results say definitely really bad for engineering. You should go -- I think it said communications or something like that.

And so I go there and she's like, okay, have you given thought of what you're going to do? And I'm like, yeah, I know, I'm going to be a computer engineer. And she was, like, I still remember, she was like really trying not to like make me feel sad and all and she's, like, are you sure? (Laughter.) I mean, have you considered?

Because she was looking at the test. And I'm like, yeah, yeah, I -- yeah, you don't need to tell me. (Laughter.)

**KEVIN SCOTT:** Where do you think that determination came from? Like, that's a -- it's an amazing thing, actually.

**DIO GONZALEZ:** I know.

**KEVIN SCOTT:** And it's probably served you well your entire life.

**DIO GONZALEZ:** Yeah. I've thought about that a lot. And so I have -- in hindsight, I have a couple of theories. I don't know if it's true.

One is I was bullied a lot. I was your typical nerdy shy kid that likes to read and likes math and everybody makes fun of, right? So, I'm that typical kid. And so that made me develop like that thick skin of like whenever people tell me you cannot be something, you cannot do, I'm like, whatever. They just saying it so -- I think that was one factor that actually I turned that anger into arrogance and I guess determination.

**KEVIN SCOTT:** Yes.

**DIO GONZALEZ:** You know, the other aspect, I find it fascinating and I wish somebody like studied that. So, the school that I attended is a Catholic school, which was terrible in many things and good in other things.

So, that school used to be an all-girls school, and they only started accepting boys later when I joined.

So, throughout the whole years, girls were always the majority in classes than boys. And the nuns hated boys. So, I grew up listening to the opposite messaging, which is I grew up listening to the nuns saying, "Oh, boys are terrible. Boys don't study. Boys are lazy. You know, girls are -- girls are the ones that are the smarts and all."

So, for me, it was normal to be like women scientists and being good in mathematics, it was just normal that women are the best, so I --

**KEVIN SCOTT:** Yeah, that is very interesting.

**DIO GONZALEZ:** Right? That's -- so, anyway, that's a theory in like because I find it fascinating because I see other, you know, other -- other cases, you know? My friends that were in, you know, more like co-ed, more like balance or majority of boys. They didn't go through that and we know that, right?

**KEVIN SCOTT:** Yeah.

**DIO GONZALEZ:** All the stories.

**KEVIN SCOTT:** Yeah.

**DIO GONZALEZ:** So, I wonder if that maybe helped me because throughout the whole years, of course, they would put like the ten best students in the whole school, they would publish it, right, on a board. And they were all girls. You know? So, I was -- when I was the top students, it was just normal. When I was the best in math and even I do remember we had math female professors.

And I -- the one in high school that was -- everybody was afraid of because -- oh, my goodness, super tough, was a woman.

**KEVIN SCOTT:** Yeah.

**DIO GONZALEZ:** So, I don't know, I wonder if maybe --

(Crosstalk.)

**KEVIN SCOTT:** Oh, I think you're very, very right and onto something here. I think role models are incredibly important. This podcast, itself, is all about talking to people who are doing real engineering and building real technology and just sort of showing that, like, there isn't just one stereotype of what a technologist is.

**DIO GONZALEZ:** Yes. Exactly.

**KEVIN SCOTT:** So I - -

**DIO GONZALEZ:** And it also shows what a big difference when -- the messaging that you give to kids, right?

**KEVIN SCOTT:** Yes.

**DIO GONZALEZ:** When they're growing up. So, I'm super fortunate that I -- growing up, I didn't have that messaging of girls are not, you know, good at math and all.

**KEVIN SCOTT:** Well, we're delighted that you -- that you got that experience. (Laughter.)

**DIO GONZALEZ:** Thank you. Thank you. Yeah, me too.

**KEVIN SCOTT:** And, like, one of the things that you spent a bunch of your time thinking about is like how we can get more diverse people and perspectives into technology.

Like, tell -- tell us a little bit about you know what -- what you -- where your passions are there and, like, the things that you're doing to try to help -- help more folks like you become like amazing computer engineers.

**DIO GONZALEZ:** Yeah. Yeah. That's very dear to my heart and that's something that I've worked a lot, which is bringing access, you know, to just underrepresented communities to computer, to technology.

And of course being -- I am a woman, I am Latina, I am an immigrant, non-native English speaker. So, I'm a minority in many dimensions, right? (Laughter.)

So, when I went into the workforce, it was immediately, of course, I was thrown and I was made very conscious, right, of what it means to be just the only woman, the only person of color, the only non-native English speaker, et cetera, right?

**KEVIN SCOTT:** Yeah.

**DIO GONZALEZ:** And so -- and it's fascinating because I have worked in three countries. In all three -- this is Venezuela, the U.S., and Singapore.

**KEVIN SCOTT:** Yeah.

**DIO GONZALEZ:** In all of them, I have seen -- I have experienced how being a minority in technology affects and how it's different.

**KEVIN SCOTT:** Right.

**DIO GONZALEZ:** And so ever since like always, like, I need to do something, you know, and help -- help others.

So, specifically women, women in engineering and minorities, people of color are really dear to my heart. So, that is something that -- and that's what I was telling you, like, in hindsight, I realized that I had great, great -- role models when I was growing up in high school, right?

**KEVIN SCOTT:** Yeah.

**DIO GONZALEZ:** And so I see how, you know, it happens so much like many girls don't have that experience. Right? And even like myself, as a you know -- when I was in like mid-level engineer, I didn't see much like higher-level, you know, women in senior positions and executive positions or Latinas, right, or people of color.

**KEVIN SCOTT:** Yeah.

**DIO GONZALEZ:** So, I realized that it's -- it's tough.

**KEVIN SCOTT:** Well, other than you, yourself, being an amazing role model for folks who are aspiring to get into the field and like folks who are like looking for what their path might look like once they're in the field, like what do you think we should be doing more to sort of encourage and nurture this diversity?

**DIO GONZALEZ:** Yeah. It's like multi-dimensional, I guess.

**KEVIN SCOTT:** Yeah, no, I know.

**DIO GONZALEZ:** It's -- it's -- everything. And, you know, one thing is like there are no women because there are no women in technology. So, I believe in one role models essential, essential at all levels from executive, mid-level, senior to, you know, high school girls and everything.

So, that's one thing. The other thing that I'm super passionate is it's about the education. You know, educating others because we women, we know that is good, right? It's the rest of us that don't know. So, I believe a lot in educating and working with our allies, right, and working with you know men that really want to help us and actually are coaching us.

Because, you know, it's super important to have male coaches as well because they have the experiences and the learnings that we haven't, right?

**KEVIN SCOTT:** Yeah.

**DIO GONZALEZ:** That we -- I have my network of women, but many of us have not been in the executive level, for example.

**KEVIN SCOTT:** Right.

**DIO GONZALEZ:** So, that's why we need. So, I believe in those two, like educating the two, the women to know we can do it, but then the men to say, "Hey, let's change it as well," and you know, those that already know help us.

**KEVIN SCOTT:** Yeah. I think those are two very good and important things we should be working on.

**DIO GONZALEZ:** Yeah.

**KEVIN SCOTT:** Completely agree with you.

**KEVIN:** So, just let's switch over to something completely different.  So, I've -- heard that you are a big road cyclist.  (Laughter.)  So, how -- I mean, the -- so it strikes me that both California and Seattle are fantastic places --

**DIO GONZALEZ:**  Yeah.

**KEVIN SCOTT:**  -- for like being a road cyclist, (inaudible) crazy traffic.  (Laughter.)  But so like how did you get into that?  Like, is that something you've always done or --

**DIO GONZALEZ:**  What I've always done is sports with legs, that's what I realized.  Because when I was -- in Venezuela, roller skating was my thing.  Like, since -- since I was ten years old, I was roller skating and then roller blading.  That was my thing.

And then when I moved to California, I -- with just coworkers, I was like -- I'm looking for a new sport, a new thing to do. And a coworker of mine said, “Be a cyclist.”

**KEVIN SCOTT:**  Nice.

**DIO GONZALEZ:**  So, it was the -- your typical Californian got me into cycling.  (Laughter.)  So, this friend got me when like he became my sensei. It's funny because I call him like he's my cyclist sensei.

**KEVIN SCOTT:**  Nice.

**DIO GONZALEZ:**  He told me he went and chose, you know, helped me choose my very first bike and taught me everything, you know, got me into the community.  (Laughter.)

**KEVIN SCOTT:**  Yeah.  It's -- it's --

**DIO GONZALEZ:**  So, yeah --

**KEVIN SCOTT:**  It's one of those interesting hobbies, like, and I haven't cycled in years and years.  But I love hobbies where you can sort of blend your ability to technically geek out on something, like, hobbies with gear are great.

**DIO GONZALEZ:**  Exactly.  Exactly.  That's why I love it because, you -- cyclists are amazing geeks about all the gears and you know and how to adjust the tension in the frame and the material of the frame against the -- doing more aerodynamic here and there.

How, you know, there's a new helmet and the helmet is (inaudible) you know it's -- it's just frickin' awesome.  (Laughter.)

**KEVIN SCOTT:**  Like I'm a camera hobbyist.  And I have way, way, way more camera than I have ability.  And, like, I suspect that that's true for many folks who are cyclists.

**DIO GONZALEZ:**  Yeah, cyclists, there's a rule that's just for -- there's even a book of the rules, you know, of cyclists.  And so there -- one of the rules is like the correct number of bicycles to own is N+one, where N is the -- (Laughter.)  N is the current number -- current bikes that you have.  So, the correct is always N+one.

**KEVIN SCOTT:**  Yeah, that sounds about right.

**DIO GONZALEZ:**  Or the number that your significant other would leave you.  (Laughter.)

**KEVIN SCOTT:**  Yeah.

**DIO GONZALEZ:**  So those two.  Either the limit of your significant other or N+one.

**KEVIN SCOTT:**  Yeah.

**DIO GONZALEZ:**  So, yeah, it's amazing.

**KEVIN SCOTT:**  Yeah, now that sounds like the same rules for cameras.  (Laughter.)

**DIO GONZALEZ:**  Yes, exactly.  Yeah, yeah, yeah.  It's -- like you said, it's a really great sport for tinkerers, like --

**KEVIN SCOTT:**  And is this hobby a big part of how you have work/life balance?  Because I know that's --

**DIO GONZALEZ:**  Yeah.

**KEVIN SCOTT:**  That's a difficult thing for many of us to have.  And not just because there's so much work to do, there's always a lot of work to do, but I know, for instance, I love the work that I do, so I'm just sort of tempted to do it all the time.

And like I fall into this trap frequently of just allowing myself to do too much of it.

**DIO GONZALEZ:**  Correct.

**KEVIN SCOTT:**  And like it's always good to sort of step away for just a little bit to reenergize yourself or to do something different, to exercise a different part of your brain or like --

**DIO GONZALEZ:**  Correct.

**KEVIN SCOTT:**  -- get physical exercise.

**DIO GONZALEZ:**  Yes.  Exercise is, for me, my -- my de-stress avenue in all.  And it sounds kind of cheesy, but it's also my Zenlike.  Like, I also use it as a meditative, like, I love climbing.

Like, as a cyclist, that's what I love, is just climbing hills.  And it's just like, you know, because then you get into this -- you become this in this moment with your breathing and all.  And then you meditate and all that, I love it.

**KEVIN SCOTT:**  Yeah.

**DIO GONZALEZ:**  And since our type of job is very mental, right?  We're sitting, just programming and all, so that's why that balance of having a physical activity to actually sweat and all, it's really -- it provides, like you said, that work/life balance.

**KEVIN SCOTT:**  Yeah, and I -- you know, I even find that when you're doing something like cycling or hiking or CrossFit, or like any number of things that looks like I've never done them in my life, (laughter) but like when you -- when you do them, like, and doing them intensely, like, you can get into -- for me at least, what is very similar to the same sort of flow state you can get in when you're programming.

**DIO GONZALEZ:**  Correct.

**KEVIN SCOTT:**  Like, really, really intensely.

**DIO GONZALEZ:**  Correct.

**KEVIN SCOTT:**  Like, where everything just sort of vanishes away and like the only thing that you're focused on is like the immediate thing at hand and like you're almost like you're on automatic.

**DIO GONZALEZ:**  Exactly.  Exactly.  And so in those sports are, again, if you -- if you like the tinkering and, you know, and geeking out and all, as cyclists, for example, you get in that moment because you're focusing your breathing.  Then your heart rate, because of course we have a -- a million -- a million devices, right?  So, seeing my heart rate, seeing my power, so make sure that my heart rate and my power are correct and then my breathing.

**KEVIN SCOTT:**  Yeah.

**DIO GONZALEZ:**  And then am I on the correct gear for this climb, you know?  For the percentage of the climb.  So, it's just -- and like you said, you become in this flow that is just amazing.

**KEVIN SCOTT:**  Yeah, awesome.

**DIO GONZALEZ:**  It's really awesome.

**KEVIN SCOTT:** Well, thank you so much for spending time with us today. Like, you've had such an interesting journey and you -- you're working on technology that's sort of right at the frontier of what we as human beings are creating right now. So, it's sort of a super fun space to work in. I'm so happy we could chat about this stuff today.

**DIO GONZALEZ:** Thank you. Thank you very much. Thank you for the invitation.

**KEVIN SCOTT:** Awesome. All right.

**[MUSIC]**

**CHRISTINA WARREN:** Well, thanks for joining us for *Behind the Tech*. You just heard Microsoft CTO Kevin Scott speaking with Dio Gonzalez. And I love how excited she is about everything with tech. It makes me excited.

She's working on tools that let people build games or whole new worlds, you know, and when it comes to mixed reality, and she talked about how the potential of mixed reality is to kind of really kind of change things. What do you see as the potential with mixed reality to really impact the world?

**KEVIN SCOTT:** Well, I think there are a bunch of things that mixed reality is going to be super important at. Like, the things that we're seeing already that are just sort of the obvious places where MR has great benefit is in this sort of whole area of line workers.

So, like, people who do jobs right now where they don't use a computer or even a smart phone at all to do their work, and where the mixed reality becomes the first piece of digital technology that they're using that helps empower them to do more and to like be able to do their job better, basically to unlock their creativity.

And so like an example of this is an elevator technician or someone doing hydraulic work on pipes or someone trying to do maintenance on a very complicated machine. So, normally, when you're doing these sorts of things, like you've got your toolbox, you've got like a bunch of manuals, like you -- you're sort of trying to decipher all of this stuff that you're seeing and like constantly referring to your like paper documentation or like a document that's stored on some sort of computer to try to help guide you through this maintenance task that you're doing.

And with virtual reality, with mixed reality, you are able to sort of superimpose a lot of that information directly on the real world, on the thing that you're working on, which lets you both diagnose problems more quickly, that gets you the information that you need to fix the problem that you're finding, and like it even lets -- it lets you take this thing that you're doing that normally is like a fairly isolated task that just you were doing and like bring other people into the problem-solving environment because like they can also you know, sort of see the world from your point of view as well.

**CHRISTINA WARREN:** Yeah, I love that, when Dio was talking about her ultimate goal of kind of being able to show everyone swipe and show everyone everything that you're thinking.

**KEVIN SCOTT:** Yeah, that would --

**CHRISTINA WARREN:** That would be very cool.

**KEVIN SCOTT:** That would be awesome slash terrifying. (Laughter.)

**CHRISTINA WARREN:** I would agree with that, awesome slash terrifying. Definitely. So, one of the interesting things she talked about is, you know, growing up in Venezuela and she's, you know, a minority in multiple ways. But I was thinking about how having those perspectives is so great for someone who is building these tools and creating these things that let us build these worlds. What do you think about that?

**KEVIN SCOTT:** I think you're spot on. I mean, I think it's interesting that as you listen to her as she thinks about her own experiences, like a lot of what she went through is sort of very formative and like gave her the determination and grit to get to this like fairly senior place that she's at right now.

And, you know, I think all of that sort of translates through as well to the problems that she's trying to solve technically because, you know, like, if you're a developer working on a frontier technology like mixed reality, like, you're constantly banging your head against the wall because the path forward's not always obvious, and it's certainly not usually easy.

But, you know, I think the -- the other thing about having all of that perspective is as you mentioned, mixed reality done right is a new way for human beings to interact with one another. You know, and there are sort of the obvious things like, "Oh, how could this help with education?" Like, how could this help with these, you know, sorts of empowering people with technology to do their work better and to unlock their creativity?

But like it's also going to be a tool that people use to interact with one another. And, you know, I think having -- it's really, really important when you're building any of these flavors of tools to like have a variety of different perspectives in their development because we all have blind spots like no matter how carefully we're thinking about how we build something, like we, at the end of the day, are sort of coming through our own -- like our own personal lens that formed by our experiences and like hopefully you've got compassion and like maybe you even have empathy, like the ability to sort of like feel what other people are feeling.

But it's still not a substitute for actually having the people who have lived those experiences be able to like bring them directly to the things that they're building.

**CHRISTINA WARREN:** I totally agree. I love it, and I'm glad that we have people like Dio working with us.

**KEVIN SCOTT:** Awesome.

**KEVIN SCOTT:** Yeah. So, I -- I think that's a wrap for today.

**CHRISTINA WARREN:** Yeah, thank you so much for joining us.

**[MUSIC]**

**KEVIN SCOTT:** Be sure to join us next time on Behind the Tech. And please, help spread the word. Tell all of the geeks and *non-geeks* you know. And don’t forget to subscribe. See you next time!