

SIGGRAPH Spotlight: Live From SIGGRAPH 2024: Art, Science, and Tech Transform Industries and the Human Experience

Voiceover

Welcome back to SIGGRAPH Spotlight. Tune into an episode recorded live from SIGGRAPH 2024 in Denver, where SIGGRAPH 2025 Conference Chair Ginger Alford sits down with three members of her committee who share insights on how discoveries at SIGGRAPH apply to industries outside of research and entertainment, blurring the lines between digital and physical realms and using art and technology to tell this story. Take it away, Ginger.

Ginger Alford

Welcome back to SIGGRAPH Spotlight. I'm Ginger Alford, the SIGGRAPH 2025 Conference Chair. Outside of SIGGRAPH, I am a professor of computer science in the Lyle School of Engineering at SMU in Dallas, and there I specialize in machine learning and computer graphics. And I work with a lot of interdisciplinary teams applying computer graphics and interactive techniques to dance, education, sports training. And I'm actually working with the mechanical engineering department to develop a graduate program in digital twins, because we think graphics is related to the future of manufacturing.

My guests and I are recording live from SIGGRAPH 2024 in Denver. We've had an incredible week discovering how computer graphics impacts all scales, from the microscopic all the way to our imagination, and we are excited to take this energy into the next year as we look ahead to SIGGRAPH 2025.

I am really thrilled to be sitting down live in person today with three members of the SIGGRAPH 2025 Committee, Adam Bargteil, Kalina Borkiewicz, and Francesca Franco. We're going to look ahead at the next year preparing for our conference in Vancouver. So welcome Adam, Kalina, Francesca. So before we start our discussion, I would love for you to tell our listeners about yourself, who you are, what you do, and how you got your start in computer graphics. So, Kalina, you're no stranger to SIGGRAPH Spotlight. Will you start us off?

Kalina Borkiewicz

Thanks for having me here, Ginger. I am the SIGGRAPH 2025 Courses Chair, and I first got interested in computer graphics as an undergrad, when I just happened to take an elective on the topic, and at first I thought I wanted to go into visual effects, because I was under the incorrect impression that within graphics, you kind of had a binary choice, either going to film or games. And I wasn't a gamer, so I thought I wanted to do film, but I'm really grateful that I somewhat accidentally stumbled upon another field, scientific data visualization, which uses a lot of the same technologies and techniques and tools that I loved, but applies them to educating people about science, which I feel really good about and I'm proud of.

So it feels like at least in some little way, I'm making the world a better place. So I've been doing that for the last 10 years, most of which I've spent at the National Center for Supercomputing Applications at the University of Illinois at Urbana Champaign, where until recently, I was the director of the visualization program office and director of the Advanced Visualization Lab. But just this January, I left

that to pursue a Ph.D. in computer science, graphics, and visualization at the University of Utah. And now that I'm a student, I'm taking advantage of my summer break and doing an internship at the New York Times.

Ginger Alford

Oh, that's so interesting. Thanks. Kalina. Adam?

Adam Bargteil

I'm a computer science professor at the University of Maryland Baltimore County, which is a mouthful, so we just go by UMBC, and I'll be the 2025 Frontiers Chair. My research is mainly in computer animation. I was working on what I call the special effects problem back in the 2000s when it was the hot new thing. I've moved on, I do all sorts of things now, from wildfires to visualization to still some soft body work.

Ginger Alford

So interesting. Thank you. Francesca?

Francesca Franco

I'm an art historian and curator with a deep passion for exploring the intersection of art, technology, and culture, and my research is centered on the history of computer art and its pioneers, focusing on how these early innovators have shaped the digital art landscape that we see today. And in my current role, I curate exhibitions that showcase that the evolution and impact of digital art, blending my academic research with practical curation to bring these works to a wider audience, and I'm dedicated to highlighting the contributions of early computer artists and their influence on contemporary practices.

Ginger Alford

Thank you so much. It's so interesting for me to hear how everyone has come to graphics from a different angle. My own start into graphics actually was working on flight simulators for Lockheed Martin, and then I was after that, doing augmented real-time video stream analysis for Raytheon. So all related to the same stuff that we do in all of these diverse fields. So thanks for sharing all that. But I'd love to hear more about what you do in your work and current projects you're working on in your daily life. So Kalina, you are a scientific visualization pro, and you even presented a Production Session earlier this week. Can you tell us more about that work?

Kalina Borkiewicz

So cinematic scientific visualization is about taking 3D scientific data sets of things like galaxies and tornadoes and molecular structures and using filmmaking techniques to create graphics that are not only educational but also beautiful and inspiring. So these are often created for documentary films and museums and are really targeting all audiences aged eight to 80.

A recent project I worked on was a flight through the Milky Way to the galactic center, where there's some stars orbiting a supermassive black hole, and that was a really exciting project. I got to work with Dr. Andrea Ghez, a recent Nobel Laureate who discovered the black hole at the center of the galaxy. So it's just really cool to work with all these amazing scientists and researchers in doing this work. And

now that I'm in a Ph.D. program, I'm doing research about visualization. So I'm trying to study how to figure out what design decisions have most of an impact on making visualizations that are more memorable, more educational, so shifting my focus from creating the visualizations to understanding the visualizations.

Ginger Alford

Very interesting. Adam, your expertise is in physics-based animation and computational geometry, and earlier this week, you even presented a course on mathematical optimizations, which I heard was quite crowded. So what are you up to right now with your research?

Adam Bargteil

You know, it's an interesting thing. When I was younger, I had a very well-defined research agenda, and I could tell you all the projects I was working on. I was very excited about all of them. But as I've gotten older, I find that I just want to do what I am having fun doing, anything that I'm having fun, and where my expertise is useful, I can contribute I'm sort of happy to be doing, which is how I end up doing things from like wildfire visualizations to soft body work to whatever comes by that's, you know, yeah, that sounds interesting, and I can help. Those are the two things I look for.

And you mentioned the course that was just to have fun, really, like I hadn't seen a course that just sort of explored a bunch of papers, and it seemed like it would play to my strengths, because I'm sort of good at just reading lots of papers and then talking about them. And, you know, I've taught seminar courses before, and so, like, I even remember I was really nervous going up to start the course, and then, like, it was, like, my lecture brain just turned on, and I got into like, a flow state, and it was just very nice, very pleasant, and I had a lot of fun. And then people keep telling me how they enjoyed the course, so I think it was a big success.

Ginger Alford

Francesca, I just love how your art curations link the past and the present. So please tell us more about that work and how it relates to the art and technology Retrospective panel that you participated in this week.

Francesca Franco

I spend much of my time collaborating with artists on new commissions and planning future curatorial projects. My focus is often on linking the past with the present, creating dialogues between pioneering works of computer art and contemporary practices. And this approach was at the heart of the art and technology Retrospective panel that I participated in yesterday, and where I had the chance to share my two latest curatorial projects with Vera Molnár, including our groundbreaking experience at the Venice Biennale. And being part of this panel was particularly meaningful, as it not only allowed me to discuss these projects, but also to engage with incredible pioneers like David Em who is one of the first artists to work with pixels and to construct some of the first navigable virtual awards, and Tamiko Thiel, who just won the SIGGRAPH Distinguished Artist Award. So their insights and contributions to the field of computer art have been a huge inspiration for me and being able to share a stage with them was a truly enriching experience.

Ginger Alford

Thank you. Lately, I find myself thinking quite a bit about how we are just immersed in the technology we create. We affect it, and it affects us on a daily basis in almost everything we do. So I envision SIGGRAPH 2025 embracing this idea while putting the human experience right in the center as we think about how to create the future. So with that in mind, I would love to ask you some things about that. So how can we take what we discover at SIGGRAPH and apply it to industries outside of research and entertainment. I mean, how do we go about that?

Adam Barteil

The main thing there is to try and make connections to those other industries. And I think that's in part why we started the Frontiers program back in 2018 is to try and make those connections, to bring people from outside industries into SIGGRAPH and tell us what they're doing, and maybe we can see where, you know, there's overlap of expertise, but also to sort of expose the SIGGRAPH community to these new ideas,

Kalina Borkiewicz

I second that I think it would be great to bring more outside industries into SIGGRAPH and just encourage interdisciplinary collaborations, bring in healthcare professionals and put them together with graphics experts and government officials and alongside graphics experts and one kind of outside industry that I've been thinking about a lot lately is journalism.

Since I'm spending my summer at the New York Times, I think there's, you know, great opportunities there. One example that I heard about from my colleagues when COVID hit, there was a lot of misinformation around the disease and how it spreads, and how masks work, and whether they work. The New York Times graphics team published these amazing visual stories that showed how, if people were in a room, how the COVID particles spread and how a mask would help prevent that. And you don't necessarily think about computer graphics being used for journalism, but that's exactly what they do. And all of a sudden, after seeing this graphic just in, you know, a minute or two, so much fear and confusion around COVID left me, because it was just so clear, like, oh, this is how it works, and this is why it works. Using graphics to tell these stories is a lot more effective than just saying, "Well, you need to wear a mask and you need to stand six feet apart." You know, using graphics in this kind of outside field really helps to convey things in a way that's easier to understand and seeing is believing.

Francesca Franco

I'm fascinated by how we as human beings interact with our environment through technology, and particularly in how creativity is enhanced by and also expanded by these tools. And I think art plays a crucial role in telling this story, and the innovations that we see at SIGGRAPH have the potential to impart a wide range of industries outside of research and entertainment. So for example, the tools and techniques developed for creative immersive experiences can be applied in fields like education, healthcare, and urban planning. So I think that by fostering these collaborations between technologists and professionals in these industries, we can translate the insights gain at SIGGRAPH into solutions that enhance our daily lives, making technology more human-centered and accessible.

Ginger Alford

So much of what we see at SIGGRAPH is blurring those lines between the digital and the physical realms. So what does it mean to cross those lines, and how can it impact our immediate future?

Kalina Borkiewicz

I'm all about blurring all of the lines, the lines between art and technology, between science and cinema, of course, digital and physical, that's something that's really at the core of scientific visualization, which is my specialty. Scientists do these 3D models and simulations of, you know, possible real-world scenarios, things like hurricanes and wildfires and floods, to understand how these things happen and how they can be prevented and how they affect the communities around these events. By working with local governments, we can actually create action plans for things like disaster evacuation and emergency communication by having these digital models.

One recent project I worked on was a visualization of the simulated effects of a dam failure and the resulting flooding of a city. In this case, the scientists were studying a real dam failure that had happened in South Carolina that had some devastating effects, and they were using that real data to improve their models for future predictions. The challenge around that is that a dam doesn't usually fail in isolation, there might be, you know, one dam that fails, and then that rush of water causes a dam further along the river to fail and causes cascading effects. And you know, if there's rain on top of that, and wind and soil erosion, there's a lot of complex factors that that feed into this. So you know, scientists are using graphics and 3D techniques to study this and make models and predictions that can help us better figure out how to use our limited resources to figure out which dams need to be fortified and figure out how to prevent cascading effects before they happen.

Adam Bargteil

Your question makes me think very quickly about this current phrase of du jour. I guess digital twins. Everybody means something different by it. It seems to be a very personalized phrase, but to me, it's this idea that goes beyond just the simulating of the real world that computer graphics has been amazing at. SIGGRAPH has been amazing at for decades now, but also to start to feed back those simulations into the real world, to modify the real world in a way that so far, only really humans have been able to do. Right?

This conference has been all about these created environments, built environments, and things humans are sort of unique in their ability to influence the world around them. And I think that what you will see, the promise, I guess, of digital twins, is that they will tell us the simulated versions will give us insights in how we can modify the real world, and that that closing of the loop is the fundamental thing that. The twins will bring so I think of it less as blurring lines, but using the natural world to inform the simulation, the virtual world to inform the natural world. And this goes even in the NASA project I'm working on, like we're talking about, you have this model, this digital, virtual model of what's happening in the world. Where are there holes in that model? What sensors can we place to try and improve upon the modeling? Where do we need to place a solar meter? Those sorts of questions the virtual world can answer, and then we can modify our natural world?

Ginger Alford

That's so interesting. Thank you for that perspective.

Francesca Franco

As we increasingly blur the lines between digital and physical realms, we are essentially redefining the way we experience the world. So crossing these lines means creating hybrid spaces where our digital creations influence our physical reality and vice versa, and this can have a profound impact on our immediate future by enabling more immersive and interactive environments that can enhance learning, communication, and even social interaction. So I think this opens up possibilities for new forms of expressions and connections that were previously unimaginable. So I'm really excited as a curator, to see the role of art in this.

Ginger Alford

That's very interesting, Francesca, because art is so important. And how can we use art to tell the story of this transformation and use it to show us where we have been and how we can continue evolving?

Francesca Franco

Art has always been a powerful medium for reflecting and shaping our understanding of the world, and in the context of this technological transformation, art can serve as a storyteller documenting our journey from the early days of computer art to the present, where the boundaries between digital and physical are increasingly fluid. So by creating works that explore these themes, artists can help us understand the implications of this transformation, providing a lens through which we can contemplate our place in this evolving landscape. And through art, we can see not just the technology but the human experience within it, guiding us toward a future where technology and humanities are more closely intertwined.

Ginger Alford

It's very inspiring. Thank you. Kalina, do you have something?

Kalina Borkiewicz

That was beautifully said, Francesca. I guess the only thing I could think to add is that, you know, I think art allows us to have a glimpse into future possibilities. If artists don't envision something, it might not happen. You know, I'm thinking back to like in the 1940s and 1950s there were like comics where some artists had imagined people talking to each other through the television instead of through the phone. You know, now we have Zoom, and we're doing this all the time, but, you know, would we have Zoom if people weren't thinking about this and, you know, making art and envisioning those futures back then? I'm not so sure. I think art is really powerful in shaping our future, and it's just vastly important.

Ginger Alford

Adam, I know you have some thoughts.

Adam Bargteil

It's funny you were mentioning the future, because I think of art as telling the story of the past. And I think about the art that we're creating today is going to be what people look to 50 years from now to understand what it was like to be around now, like when I think back to being in high school, right? I don't remember so much the history textbooks that I read. It's the stories that were written at the time

that really told the story of what it was like to be alive. Then I can read about who was elected president, but that doesn't tell me what it was like to live through the Depression. And I think that it's the artists who will be telling the story to future generations about what it was like to be around now, when AI is doing what it's doing, and when these lines of the virtual worlds and the real worlds are starting to blur and inform each other, and all of this exciting stuff has happened.

Francesca Franco

This is actually what really excited me the first time I approached the field of the history of computer art, when I started really getting contact with the pioneers of this field. So they made me realize that this was history, but also very much alive. So the opportunity to work with them directly and to see how their work influences and inspires younger generations is to me, is unbelievable, and is what keeps me continuing this research.

Ginger Alford

Some wonderful, interesting ideas here. All right, so let's talk about SIGGRAPH 2025 and the lovely city of Vancouver. It's a modern city surrounded by age-old nature, and we are looking forward to being on the harbor and seeing the mountains from the beautiful convention center. SIGGRAPH has a rich history, and many of our contributors and creators reflect on our earliest ideas to advance computer graphics entertainment. And more and so thinking about our setting, how can the next years enhance our world?

Francesca Franco

It's a great question, and to me, it's key to see technology as a tool that expands our potential and transforms how we engage with nature and always with a focus on sustainability and respect for the environment. So I was hugely inspired by the venue where we're going to have the conference. So I can't wait to be there and work in that environment.

Ginger Alford

So what is your take on technology's impact on nature? How can we think about that?

Adam Bargteil

So it's easy to focus on the negative stuff, right? Climate change, right, the wildfires that are burning. It's easy to see those things, but I think there's been lots of positive impacts of technology on nature as well. Maybe I'm an optimist, but I think that there will be, you know, dramatic impacts of technology on nature. Right? My impression of humanity is that we tend to go along our course until, not until it's too late, but until it gets really dire. And so I actually expect that humans will come up with a way of not necessarily reversing climate change, but doing something that ameliorates it, and using technology, right? I think it's one of these things. Technology is getting us into this mess, but I think technology will end up getting us out. And I think about how technology has affected our lives, and it's always this double-edged sword, right? Like, I no longer need to keep maps in my car, and I don't get lost as much. But then, you know, there's plenty of distracted drivers, right? Technology sort of, it's almost like having one of those vibrant filters on your camera, like it makes everything a little bit more intense, maybe, and it changes things, not necessarily for the better or for the worse. It just it does create change.

Ginger Alford

Kalina, do you have some thoughts for us as a scientific visualization expert?

Kalina Borkiewicz

I do. I have a lot of thoughts on this. Yeah, I agree with you, Adam, that there's two sides to this coin. Of course, I want to acknowledge the energy consumption and the climate impact of the massive amount of computing that is needed for training and running AI models. But you know, on the flip side of the coin, there are advances that are happening in GPUs and hardware and software as a result of this AI boom that are also benefiting scientists and researchers who are doing good in the world.

The keynote this morning from Manu Prakash was such a great example of that. He credited advances in GPUs for being able to develop real-time diagnostic tools for malaria. It was so inspiring. And scientists are using GPU-accelerated supercomputers to model different future climate scenarios, and, you know, find ways to curb climate change. So there is a lot of good happening as well. If you think back to earlier days of computer graphics, a lot of real-time rendering technologies were developed for video games in mind, but now we have real-time technologies also being used by doctors to do data analysis of medical scans to detect and diagnose cancers in early stages. So these advances in technology, you do have the potential to give back to humans and nature in a very positive way.

Ginger Alford

Francesca, did you want to share more thoughts on those lines.

Francesca Franco

As we move forward, the next years offer an incredible opportunity to enhance our world by integrating technology in ways that promote sustainable living and greater connection with nature. So by using computer graphics and interactive techniques, we can create experiences that not only entertain and inform but also inspire action toward environmental stewardship. So for instance, immersive simulations and visualizations can raise awareness about climate change, ecosystem preservation, and the impact of human activities on the planet, making these issues more tangible and immediate.

Ginger Alford

Thank you for such thoughtful and hopeful answers. It's very encouraging. So looking toward SIGGRAPH 2025 in Vancouver, as its Frontiers, Courses, and Art Gallery Chairs for the conference, can you please share with our listeners a glimpse of what you are planning for our conference next year?

Adam Bargteil

Frontiers, what we do is we try and identify topics that we see on the frontiers of SIGGRAPH, and then we try and organize things around those topics so and looking towards robotics as being a topic, and in particular, like how robots get into our home. Jensen talked a little bit about this on Monday, but I've been thinking about it for a while. Robotics in industry has changed dramatically over the last decade. They're sort of everywhere, but they're in warehouses, and we don't see them. And those are not the sort of robots we would welcome into our homes. I think in some sense, we don't get a whole lot of opportunities to get this right, bringing robots into the home. If we screw it up, then people will avoid this

for a generation, right? Sort of like they did with 3D you know, there was this big bird in the late '80s and like, it was so bad that nobody wanted to touch 3D for 20 years. We run that risk when we try and bring robots in, right? If people start getting hurt by them or and things like that, then it's going to be very poor. So I think this HRI, human robotics interaction, is a huge piece of the puzzle. And I think that computer graphics, SIGGRAPH, and digital twins, are going to play a huge role in that

Kalina Borkiewicz

One idea that we have been discussing, Ginger and Adam and myself, with other members of the 2025 committee for the Courses program is to provide more value to our attendees by perhaps offering a certification to those who complete a course or a series of courses, to really give attendees something a bit more tangible. Of course, you know, the knowledge gained at the conference is invaluable, but having something that you can put on a resume and help really advance your career in a more visible way through that professional development could be something really valuable, and looking into ways of making that happen.

Ginger Alford

Tell us about the Art Gallery, Francesca.

Francesca Franco

Well as the Art Gallery Chair for SIGGRAPH 2025, I'm excited to share my vision for the upcoming exhibition, which centers around the overall concept of connecting nature, art, and technology. And as I mentioned before, I was immediately inspired by the location and venue of the Vancouver Convention Centre, which is surrounded by this beautiful Vancouver harbor and overlooks the mountains. So this setting perfectly complements our themes, and I'm really thrilled to have the next Art Gallery there.

And like Adam, I have a list of topics and themes that I like to explore. So one is the integration of outside and inside. So one of the key themes is the integration of nature with indoor spaces. So we'll be showcasing art that brings elements of the environment into architectural settings, creative, and immersive experiences where nature and technology coexist harmoniously. There's also this concept that I'm really keen on exploring, this interaction versus long-term influence. I'd like to focus on the dynamic interplay between works that provide an immediate engagement and those that leave a long-lasting influence on viewers. So the exhibition will feature pieces that capture the moment, but also works that encapsulate a deeper reflection and have long term impact on how we view our relationship with technology and the environment.

Then there's my huge passion for the pioneering work. So there will be this theme about pioneers and younger generations. Celebrating the legacy of pioneering artists is essential to our exhibition, but we're also looking to the future by encouraging innovative works from emerging talents. By bridging these generations, we aim to showcase the evolution of digital art and its potential moving forward. Vancouver's unique environment and culture will be woven into the fabric of the exhibition, making the city itself a vital part of the experience. We want to reflect Vancouver's natural beauty and vibrant culture, ensuring that the location enhances enriches the art on display. So I do have a vision, and I would really like to explore the integration of nature with technology. I would really like to celebrate all these themes together and be inspired and surprised also by the proposals that hope will receive soon.

Ginger Alford

I am excited by what you guys are cooking up for 2025, I really am. And also want to mention, Adam. When you said Jensen, the other day you met Jensen Huang, the CEO of NVIDIA, who gave not one but two keynotes at SIGGRAPH 2024, and it was exciting to hear his vision of the future, how graphics impacts every aspect of our world. And it is pretty exciting time to be in graphics right now, and with the explosion of generative AI and all of the data that we have.

Adam Bargteil

If I could add just one quick thing, the Frontiers program is a little bit unusual in that we don't have a normal call for submissions. So if anybody's listening to this and you have an idea for something that you think might be a good topic, or you'd like to get involved with the Frontiers programs, either one of the workshops or the talks, or otherwise involved, please do reach out to me, because we're always looking for things on the frontiers of SIGGRAPH, and we don't always know what they are because they're not in SIGGRAPH, they're on the frontier. Thanks for your help.

Ginger Alford

Well, Adam, I appreciate that the Frontiers program was something you envisioned years ago when you were working with the EC, and as president of the EC, you realized that reaching out to new communities where graphics connect was something that needed to happen to solve some of these problems we've been talking about. So thank you for that. Well, thank you all. Adam, Kalina, Francesca, thank you for joining us today and sharing your thoughts and your expertise with the SIGGRAPH community. Great to have you here.

Kalina Borkiewicz

Thank you. Great to be here. Such a great conversation. Thank you, Ginger.

Francesca Franco

Yeah, thank you Ginger. And I look forward to SIGGRAPH 2025.

Ginger Alford

Yes, me too. So please mark your calendars for SIGGRAPH 2025 it'll take place August 10 through the 14 in Vancouver, and we cannot wait to see you there.

Voiceover

Thanks for joining us for another episode of SIGGRAPH Spotlight. We can't wait to see you at SIGGRAPH 2025, taking place August 10 through 14, 2025, in Vancouver, until next time.