Speaker 1:

Welcome to the Michigan Minds Podcast, a quick and informative analysis of today's top issues from University of Michigan faculty.

Speaker 2:

Thank you so much for joining me today on Michigan Minds. But before we start our conversation, could you please introduce yourself and share a little bit about your role at the University of Michigan?

Anıl Çamcı:

Of course. My name is Anıl Çamcı. I am an assistant professor and Director Of Graduate studies at the Department of Performing Arts Technology at the University of Michigan's School of Music Theater and Dance. My work lies at the intersection of virtual reality, spatial audio, and musical interaction design, exploring human computer interaction in digital music applications and immersive contexts. I build multimedia systems for artistic expression. These range from interactive and immersive experiences that I create as part of my own artistic practice to creativity support tools that I develop to allow artists and content creators to design such experiences and engage in musical creativity themselves.

I teach courses on creative coding, sound production, and immersive media, and this is my sixth year at the university. So I guess I don't count as new anymore, but it still feels very fresh in part due to our field at large being always on the cutting edge, but also because our university is such a vibrant environment.

Speaker 2:

Thank you so much for sharing that insight into your background. Recently, your work has focused on a pilot project that is funded by the Arts Initiative, an initiative that invites members of our UM community to enhance human connections, inspire collaboration, and create more equitable world for all. Can you please share a little bit about your project, bringing down the fifth wall and its goals?

Anıl Çamcı:

Absolutely. The Fifth World Project started out with the goal of bringing virtual reality music performances to large audiences. To break that down a little further, virtual reality music performance can take several forms. Some of the musical applications we find in VR today are more consumer facing applications where anyone could go into VR and play with a musical system in the style of playing a game. But then there are VR performances where an artist or performer goes into VR and leverages this medium as a musical instrument in front of an audience. And when I mention a VR instrument, I don't mean like a virtual violin that you would play in a simulated space. I think that does injustice to both violins and VR. What I mean instead are instruments that would otherwise be impossible to implement. Maybe this is an instrument that defies gravity or laws of physics.

Maybe it's an instrument where your body can pass through the instrument, or maybe it's an instrument that is blown up to the scale of a planet. So these would be instances where the use of the virtual medium in this musical application is truly justified. But nevertheless, with current VR technology and consumer adoption, it is not yet quite possible to bring an entire concert audience into VR along with the performer. It would be neither cost effective nor sanitary. So a lot of the VR performances today involve showing the audience what goes on in VR in some way.

A common approach is to take the feed from the performer's headset and show it to the audience on a projection screen. The downside to this is that it burdens the musician with another layer of performance, right? In addition to playing their instrument, they now have to curate what's being shown to the audience.

Furthermore, in daily life, we utilize these minute head movements to orient ourselves in our world, but when you take the feed from someone's headset and project it on a large screen, those minute movements become amplified and display a very jittery representation of the virtual space. So it doesn't look very good. Another option for showcasing VR performances is to set up virtual cameras in VR and show the feed from those cameras to the audience. And I've done that for many years, and it's a very tedious process that requires planning every shot. And if this is a room scale VR experience where the performer moves in VR space by moving through their actual physical space, this might require the camera system to be reconfigured for each new stage, which is, again, very cumbersome and becomes a barrier to these kinds of performances.

The system we are developing as part of this project aims to capture best of both of those approaches. And to take it even further to achieve this, we have looked at some common cinematography and camera movement techniques and film like panning, dolling, trucking and zooming and first person, third person cameras, and we implemented those in a game engine.

We then designed a system around those techniques that can configure and control the camera system procedurally based on A, the music that is being performed in real time, and B, the way the performer acts or moves and behaves in VR. That way it creates somewhat of a filmic representation of what's going on in VR in a procedural way. And what we end up showing to the audience becomes much more engaging and immersive in terms of what's being represented from the virtual space wherein the musician is performing and it is reactive to what's happening in the performance, and it doesn't require a cumbersome setup ahead of time so that artist can engage in this practice and leverage VR in their performances without extensive efforts. So it's trying to make those types of performances more accessible.

Speaker 2:

Thank you so much for sharing that insight, and that sounds so interesting.

Anıl Çamcı:

Thank you.

Speaker 2:

Your project is an example of arts research, an area that is not always well known or understood across the university community. How do you describe arts research?

Anıl Çamcı:

That's a great question, and it's a tough one. There are international committees and conferences dedicated to addressing that question. So this would be my interpretation, and I might oversimplify it in the interest of time, so take it with a pinch of salt. But if research is a desire to understand or discover things that we have yet to understand or discover, artistic research can be viewed as a way to reflect on creativity and understand it. If art as an introspective process is one of the defining qualities of humans as species, understanding the nature of and the mechanisms that underlie artistic expression is a very important and rewarding process or pursuit. Artistic research often adopts interdisciplinary methodology in that pursuit, and interdisciplinarity is not new to the arts by any means.

Even if we look at performing arts in the traditional sense, for instance, music closely collaborates with mathematics. Acoustics is a branch of physics that immediately informs musical practices, and similar intersections exist in almost all art forms. But with the emergence of technology mediated practices in the 20th century, such connections became a bit more explicit. As a result, the overlap between the arts, science, and technology underlies many artistic and academic practices today. And artistic research can stem from a hypothesis, just like in scientific research, or it can originate from more exploratory questions like what does immersive media mean for the future of musical expression? And what unique possibilities do such media offer us in that regard?

In my case, I come from a diverse background rooted in music engineering and multimedia computation. My work and training have touched upon and taken place across different disciplines. So from my perspective, there isn't a massive distinction between research of one kind or another. So to give an example, part of my research is involved in making musical creativity, especially technology driven practices accessible to broader audiences and making those practices more participatory. So I would apply common research methodology to understand what makes a new musical interface more usable or participatory. And again, it can be more open-ended, like looking at a new technology like VR art systems and finding out how it can facilitate new forms of creativity. And then discovering how artistic practices can reflect back on the technology and guide its future development.

Speaker 2:

Thank you for your insight into that question. During the COVID-19 pandemic, virtual events and virtual reality experiences provided an escape to the outside world. How did the restrictions on coming together in person inform this project?

Anıl Çamcı:

That's funny, I guess in a dark comedy way. I've worked on the proposal for this project in the late 2019, and the proposal was submitted in March, 2020. So we've had some idea of what was happening, but we've had no idea where it was headed. The project came from a very practical need to realize these large scaled virtual reality performances with in-person audiences and navigating a pandemic was not at all part of the initial proposal. And the arts initiative organizers did a great thing there. They reached back out to the primary investigators and asked how their projects could or should be reimagined in light of the pandemic. That was very useful. All the virtual meetings, the virtual conferences and performances that followed were almost like unfortunate self-fulfilling prophecy for this project. Suddenly the project gained a new meaning going from a new way to deliver performances to one of the remaining viable ways of doing so.

We immediately started thinking about how some of the pieces that we were working on could be fashioned into network performances and streaming performances. Some of the research plans, especially those involving user studies, had to be deferred. In the meantime, these big tech companies started exploring virtual concerts as a way to engage with their user base. The whole push towards the metaverse, which remains a bit of a nebulous term, gained momentum somewhat as a response to the pandemic.

So although we preserved the core idea of the project as it was conceived, we had to adjust how it approached the idea and what kinds of outlets and applications it could lead to. Since then, we've carried out numerous network performances at conferences and virtual venues. And the project evolved in honestly constructive ways.

Speaker 2:

Through your work and the help of student researchers, you have worked to create a virtual cinematography system that utilizes audio and user engagement. Could you please describe what these user interactions look like?

Anıl Çamcı:

The music that is being performed by the musician in VR serves as one of the primary modes of interactions. So we apply music information retrieval algorithms to the realtime audio feed, meaning the music that is being performed, to extract musical features and have them control the camera system. So when we think about the relationship between music and accompanying visuals or cinematography, there are some low-hanging fruits, right? The visuals can fade in or out along with the music. The cuts between the cameras can follow the rhythm of the music, but then there are more nuanced questions that are still ongoing aspects of our research.

We are analyzing a host of musical features like noisiness, spectral centroid and perceived sharpness. And we are asking, okay, how could those be mapped to the camera system? And on top of this, through the tracking technologies that are built into modern VR systems, we have access to data on where are the performer is in virtual space, what they're looking at and what they're holding or reaching out to. And all of these also serve as interaction queues.

So for instance, we do gaze analysis and have a rolling list of objects that the performer might be paying attention to at any given time. When a certain attention threshold is crossed, the camera system picks up on the objects that the performer engaging with and says, "Okay, maybe there is something there to be shown to the audience, and the next time I'm moving towards an object or cutting to a new camera, I will cut to that object."

All of this is so that everything doesn't have to be curated in advance, and there is room for improvisation. The performer doesn't have to stick to a script. They can improvise musically, but also in terms of how they engage with the virtual environment and the system should adapt itself to it. This is also meant to make the concert experience feel more natural to the audience. When an actor pays attention to an object on stage or on screen, the audience is immediately drawn to it. So the camera system delivers what the audience might expect to see and does it in a way that's at a high level governed by the music.

Speaker 2:

It sounds like such a great experience for all. I want to shift gears a little bit. You and your team are working to provide four virtual reality experiences that will showcase your system in real time. Could you tell us a little bit about what that experience will be like and how individuals can participate?

Anıl Çamcı:

Sure. The performance we are planning involves a somewhat usual performer audience relationship in a relatively unusual setting, which is kind of the point of the project in that we want to leverage existing traditions and concert spaces and offer a system that can easily be integrated into people's artistic practices and augment their work with what virtual reality can offer. We've been working on, like you said, four primary major scenes and a couple of additional VR instruments to be showcased. So far students from the School of Music Theater and Dance, school of Engineering and School of Information have contributed to this project. I also have two faculty collaborators from SMTD in the Composition and Food Departments. So it has been a very interdisciplinary effort. The faculty collaborators are Eric Santos, the head of our composition department, and Amy Porter, who's a professor of flute. And Amy and I have previously collaborated on a VR performance project.

At the time, she was working with the medical school on a project about understanding the anatomy of her unique technique as a performer. So they developed 3D models of her upper respiratory system, and I had this idea of having her fly through these models as she played the flute and show to the audience a copy of what she's seeing in her headset in CR. So from her point of view, she was flying through these cavernous spaces that are wide and then narrow, and ultimately she flew through this brass tunnel where light seeps in from the gaps in the ceiling. And only when Amy flew out of that tunnel and looked back, the audience was able to see that they were actually flying through her ribcage, nasopharynx, and finally, the flute. This was presented at a flute conference, and Amy told me that the practitioners who was in attendance were very moved by the experience.

So we've been wanting to do another thing for a while. When this project came up, I reached back out to her. Then I reached out to my colleague composer, Eric Santos, to see if he would be interested in writing a new piece for Flute Electronics for Amy to perform, which he graciously did. But during those conversations, he became very interested in this idea of performing in VR. So I asked him whether he would be interested in performing in VR himself. So we start there. We start with one of Eric's tunes. It's for vocals, guitar, and harmonica. He will be in VR while performing, and it's like this full tune. It's very lovely. It's very cozy. It's an amazing song. So I was like, why don't we contrast that with a cold science fiction environment? Eric was totally on board. So Eric's performance is set in this abstract outer space environment.

We then fly from there down to earth, and we were discussing concepts for these environments with Eric and Amy. And Amy expressed interest in performing at this place in Michigan she has a connection to. It's the Whitefish point in Paradise, Michigan. So we took that as an inspiration, and we did not want to just recreate it. Because again, VR needs to go beyond what's already there. So from outer space, we land in this island that has references to Whitefish Point, but then add some surreal elements on top of it that react to Amy's performance. Then we start moving into the ocean. The weather begins to take a turn, and we arrive at this station in the middle of the sea where I perform with a virtualization of my modular synthesizer. That's my instrument, which is a hardware instrument. But the virtualization actually controls the real things, so there's this connection between virtual and physical spaces.

And I gave a preliminary performance of this at Chicago's Experimental Sound Studio in late August, but this time it'll be presented in the context of this virtual journey that spends multiple performances. From there, we travel a little further and arrive in this warehouse where I will perform networked VR performance with my former student [inaudible 00:19:30] , who's now a PhD student at the University of Virginia. So I will be on stage in VR here in Ann Arbor, and he will be joining over the network from his home in Charlottesville, where we will collaboratively build this musical Rube Goldberg machine and create these poly rhythmic structures in VR.

We actually performed that piece a couple times this year, virtually at conferences in Brazil, Japan, and the US. So it's a really nice sort of playful game/musical experience that we built together. Then, like I said, we are currently considering incorporating some of the previous and new VR instruments that my students are working on.

Speaker 2:

That sounds like such a cool experience for all who get to participate. Now that the first phase of your project is coming to an end, what do you think the next steps are for your future goals or the future of this project?

Anıl Çamcı:

Yeah, that's a great question. The network collaboration aspect that I just mentioned, where two or more people perform in the same virtual environment, but in different parts of the world. And again, this was partly forced upon the project due to Covid. That aspect gained way more prominence as we continue to recognize the capacity of VR to provide a shared creative context for people who are not co-located. So we are planning to further lean on that. Also, as the project developed, we discovered educational applications.

The problem of presenting a single user VR experience to an audience is not exclusive to music performances. And with growing use of VR in our classrooms across many disciplines, we run into that same problem. So for instance, in my immersive media class, there are times where I, as the instructor need to go into VR to demonstrate a concept or technique that we are exploring.

All of a sudden we have the same situation. I become the performer in VR and my students become the audience outside of VR. So this system will therefore support instructional activities to showcase virtual environments to student cohorts in a dynamic way and from multiple angles so it will not only make the content more engaging, but potentially reveal aspects of the work that may not be immediately visible from the user's point of view. We are also planning to revisit our plans to carry out user studies for the more nuanced mappings between audio futures and the camera system that we developed.

Speaker 2:

Thank you so much for that insight and good luck moving forward with this project.

Anıl Çamcı:

Thank you.

Speaker 2:

What is one takeaway you hope everyone listening will have for this information that you've shared with us today?

Anıl Çamcı:

I think this project is a good example of how technology presents an opportunity for artistic expression in the beginning. In this case, virtual reality technology enabling a new kind of performance practice. But then through the interactions between these two domains, the arts begin to prompt a need for new technology. In this case, an interactive virtual cinematographer system for music performances. We can sometimes arrive at the misconception that technology serves and elevates art in a unidirectional manner, but art often elevates technology in return, and there's an inherent reciprocity between the two. Looking at this project and the ones that my Michigan colleagues are engaged in, the arts initiative is serving as the perfect springboard for these kinds of ideas.

Speaker 2:

Thank you so much for sharing that. And before we wrap up today, is there anything else that you would like to share about your work or your arts initiative pilot project?

Anıl Çamcı:

Sure. If you'd like to learn more about my work, you can check out my personal website at Anilcamci.com. That's my first name, last name.com. Students who are interested in any of these topics, they can sign up for my classes, but I also lead research groups and there might be opportunities for them to get involved in this project or projects of similar nature. Needless to say, they can also reach out to me if they need any support or guidance in these areas.

Likewise, faculty members who are interested in this type of research are also welcome to reach out to me. I'm engaged in several interdisciplinary projects from all across the campus from engineering and information to medicine and nursing. So I'm always happy to support ideas and collaborate. And I would say that that's true for all performing arts technology and moreover, School of Music, Theater and Dance faculty. So reach out to our department, our school. We are always excited to work on big ideas at an intersection of multiple disciplines.

Finally, I would encourage faculty and researchers at Michigan to engage in the arts initiative. There are already some really inspiring projects that grew out of the initial phase of the initiative, and they are not only supporting ambitious artistic projects, but also instructional activities. So I would highly recommend checking out the initiatives website and looking at the opportunities they offer.

Speaker 2:

Thank you so much for sharing that, and we'll be sure to link to all of the things that you mentioned in the show notes as well. Thank you so much for your time today.

Anıl Çamcı:

My pleasure.

Speaker 1:

Thank you for listening to the Michigan Minds Podcast, a production of the University of Michigan. Join the conversation on social media with #UMichImpact.