Enhancing Accessibility for Deaf People through Augmented Reality - ACCESS 2024 - 3Play Media

[00:00:00.20] JENA WALLACE: Welcome, everyone, and thank you for joining us today for day two of Access 2024. My name is Jena Wallace, and I am on the marketing team here at 3Play Media. I use she/her pronouns. I am a white woman in my 30s with light brown hair and green cat-eye glasses.

[00:00:18.60] [AUDIO OUT]

[00:00:22.90] I am so happy to welcome you all to the session, Enhancing Accessibility for Deaf People through Augmented Reality. Today we are joined by Brenden Gilbert, technology leader and accessibility advocate. Thank you so much, Brenden, for being here today. And I will pass it off to you for your presentation.

[00:00:42.68] INTERPRETER: Well, hello, everyone. Hopefully your day is off to a great start. I am here to hopefully have a fun chat with you regarding some ways to improve accessibility for deaf persons using technology that you likely are familiar with, augmented reality. And I'm just going to call it AR throughout my presentation. So augmented reality is probably something you're familiar with but not in this format. So look forward to talking with you all about some ideas I have.

[00:01:20.42] First, I'll tell you a little bit about who I am. Beautiful picture, isn't it? Anyway. I just-- not here to talk about the picture, but I do want you to know a little bit about me and where I'm from. I was born deaf and have grown up using sign language. I did learn to speak. However, I do have what we sometimes refer to in the community as a deaf accent.

[00:01:48.44] And I would say I've lost count. I've been working in this field for probably 28 years. I've worked with a number of different companies, primarily small businesses. And then I was able to join IBM. I was there for quite a long time before moving into Meta. And that is really where my journey exploring accessibility technology and pushing for accessibility in larger spaces and throughout our day-to-day living became important to me.

[00:02:21.23] I know that for deaf people to succeed, they need full access to communication and to making business phone calls, making and being a part of technology improvements so that life is much better. And we're really taking full advantage of all of the technology available to us now so that we are able to become independent and make spontaneous phone calls when we choose to join in gaming communities and other opportunities through business, et cetera, and do that in a way that is equal to our peers.

[00:02:59.49] I'm a gamer. So I play Xbox, and I play a lot of the old traditional-- or some of the vintage games. I actually have a number of vintage gaming consoles. You can probably see a peek of that behind me. But I am here to talk more about a vision I have regarding better application of augmented reality.

[00:03:28.67] So my company is called Deaf Eye Consulting. I have been in product management and am a visual access provider with a number of different companies and a consultant with a number of different companies, Sorenson VRS, Purple, Combo, and even some additional technology companies.

[00:03:57.99] All right, let's move into the important topic, not me, but augmented reality. So accessibility in AR, and again, I'm going to bring a deaf person's perspective. Typically, when we think of augmented reality, we are looking at real-world application, the ability to touch and feel and interact with an environment in our phone. And we're able to see things as if they are actually present in our space to enhance the experience of gaming, for example, to be able to be engrossed in Pokémon.

[00:04:41.24] How many of you play that? That is a way to really immerse yourself in a different number of environments. And with glasses, the information can be accessible in real time, directly in front of the user, which seems like a really amazing option because you're not having to look at a separate device. You're able to work hands free. So as you're participating in the real world, you're also getting a chance to truly experience the same feeling as others would in an augmented reality environment.

[00:05:16.90] So I think it's great for game playing. Again, refer to the Pokémon image I have here, Pokémon. And then I want to talk about real-life application, not just gaming. So there's a video playing there. There's no sound, if that's alarming you. But I did work with a company called XRAI, and they provide captioning, as you see here at the bottom of the screen. And I will share their website through my resources. But it is XRAI.glass.

[00:05:53.44] And through XRAI, I learned about a special product that is looking for the best ways to incorporate AR into glasses so that that accessibility is directly in line with my view. Now, I know the image is a little small, but this is an example of what those look like.

[00:06:17.65] I am able to see the captions with these glasses on right in front of my environment without having to look down, find them on the screen somewhere, or having to look back and forth between a captioned box or captioning somewhere else on the Zoom screen. I actually have the captioning directly in front of me wherever it is I'm looking as I participate. And it's very cool. We are wanting seamless interaction with the environment. And for me, that really enhances the experience.

[00:06:59.82] The second product is really awesome because one of the issues with movies, game playing-- with movies, often what you will see-- I don't know if you all have seen it-- but it has a caption view. Or sometimes to make a movie accessible, they will have the big, heavy glasses that will allow people to try to access captioning in a movie theater. The gooseneck caption view device is also difficult to manage.

[00:07:34.69] So this actually allows users to incorporate or to connect to captioning in a movie theater or whatever it is. They can wear these glasses that have a message transmitted through your personal device in a way that's accessible to you. And so it is really a big issue because

currently, when I go to a theater, I have to get this awkward gooseneck device. I set it up, if I can get it to balance. I turn it on when the movie starts. It's not working.

[00:08:13.42] Then I have to go back out to the front and find out what's going on with it. But there's something that has to be turned on within the movie theater itself. And if they are not running that feature, then I have no access to a film, a film that millions of dollars has been invested into for an audience enjoyment. And I miss out on a big part of that experience. So this is an option for me to take full advantage of and fully immerse myself in that film.

[00:08:50.17] Now, the captioning is exciting enough. But if we look at sign language accessibility through augmented reality, you will see some really cool things in the works. There are a couple of different-- in the past year, I've worked with WhatsApp as a deaf consultant to talk about some of my experience. There is another company called VSL Labs, and they have reached out to me to look at how ASL recognition can be improved in the use of avatars using AI.

[00:09:33.64] So with artificial intelligence, we have an ability to move between English and American Sign Language. And you will see there the settings on that middle panel. And that's a peek at the back-end side of the app. But if you are-- suppose there's a wedding, and you're-- like in this example, it says the wedding was set outside, but then it rained.

[00:10:04.41] So it captures the key vocabulary in American Sign Language in what we call a gloss or a reordering of the grammar to fit American Sign Language. That happens in the back end so that the avatar itself is able to present an interpretation of that message in proper grammatical order. And this has been designed and-- I'm going to see if I can play this for you again. One second. There you go.

[00:10:43.59] You can see that then the interpreter, as it were, can be moved around in space. It's pretty basic language. Because there is such a great deal of context and a great number of different contexts and concepts out there in the world. So this would work ideally in very basic situations, such as a hotel. They will not be able to set something up for every conference that is hosted in that facility. But for the day-to-day interactions at the hotel, this could be ideal.

[00:11:23.28] Now, we are looking at the potential for actually seeing live or human-produced sign language interpretation. If someone, say, a mechanic is working on a vehicle but needs access to communication, you can imagine how difficult it is to look back and forth between the work that they are doing and a sign language interpreter on site.

[00:11:47.92] In the education system-- and this is an experience I grew up with-- I was forced to look directly at an interpreter. I would not be able to access any visual aids in the classroom and make eye contact and engage with the instructor and look at the interpreter at the same time because our eye gaze just doesn't work that way. And there would be times where I would go to make notes and miss part of the lecture. And it became very difficult to access it.

[00:12:19.46] And so I have really been thinking a great deal about the types of applications for this. I worked in a data center through my previous work, and I would have to look at what it I

was working on in the machine, then turn away from that to be able to access communication through the interpreter. And looking back and forth is not only more time consuming, it's a pain in the neck, literally.

[00:12:44.66] So there are companies out there that are looking at new technology that they are working to continue improving, that it will allow someone to access sign language. However, the limitations of that now are in a limited visual space. They will focus on the top half of the body where most signing is, but there are signs such as the sign for dog that are signed outside of that central space. And we want to make sure that those are not missed.

[00:13:22.30] Now, an avatar solves that issue, but is that something that would be able to be put in place anytime soon? Not likely. It's something that is going to be part of the development. But the idea is to have a live interpreter or, in order to fully access the tone of voice, the facial expression that is so integral to our language that is missing in written language, missing through AI technology. There are thousands of different small manipulations on the face that can dramatically influence the meaning of the message, and those can only be captured through a live interpreter.

[00:14:11.43] So I have a lot of ideas, and I believe we talked about the glasses. We could also look at ways to enhance environmental alerts, such as notifying people that there is an ambulance in the environment. If I am in my phone, texting or working, and an ambulance goes by, I might not even know that it's available. I could be walking straight in front of it and not realize it if I'm engaged in something else.

[00:14:42.51] If there was a way to place an alert in my visual field that actually also gives me directional information about where the sound is coming from, that would allow me to move my eye gaze to what it is that I need to focus on, which would be ideal. And it would give me an experience that is far more like the experience that you as people who can hear, your environment, can access. And there are a number of different contexts where the alerts might look very different.

[00:15:19.07] There are times where in captioning I don't necessarily know where the sound is coming from. There's overlapping sound. Being able to identify the direction from where a sound is coming can be tricky. So that might be solved with this technology. What about a timer on the oven? Suppose I could get an alert that allows me to remotely turn the oven off so my food doesn't burn.

[00:15:55.45] So for years, I have missed alerts as they come through my phone because the only option I had to alert me was vibration. And then I would have to get my phone out, take a look at it instead of having something that shows in my visual field automatically.

[00:16:16.07] Now, I don't know if you all have children who are learning to sign or-- there are apps. Samsung has, again, accessibility tools in sign language, but they're in your phone. And if your phone is not with you, then you miss out on those alerts, that information, et-cetera, through sign language. In the glasses, they are with me at all times. And I will expand on that, hopefully, during our Q&A session.

[00:16:52.10] Signing assistance using AR glasses, Apple CarPlay, for example, and Android Auto are not accessible to a deaf person with voice commands in the way they are for those of you who can hear. I want to have the same access in my language, in a signed language, that allows me to interact with those devices because you have to keep your eyes on the road. A heads-up display or something more like that would be ideal. That is likely a little ways away.

[00:17:35.55] I am seeing glasses that are allowing us to access signs through in that visual space. However, there are very defined parts of sign language that are very detailed, and distinction between those is a little bit difficult to refine in the small space of AR at this time. So there are headsets that have cameras. There are other devices that are working towards improving that.

[00:18:12.71] If I were able to very briefly sign something like, I want to go to the Walmart in Haslet, and that to be able to from sign language pull it up on my screen in the same way voice commands work in your vehicle, that would be an incredible improvement.

[00:18:34.47] OK, now it's your turn. I have given you a lot of great ideas. I want to open up this fireside chat and receive some questions from the floor. If you'll give me just a moment, we're going to switch to the other interpreter, and we'll get started in that conversation.

[00:19:03.86] INTERPRETER: All right, I can see Lisa now. Ready to roll. OK, everyone, open for questions. Fire away.

[00:19:13.14] JENA WALLACE: Awesome.

[00:19:13.69] INTERPRETER: Or actually, if there's any other-- OK, I see you now. Go ahead. Who is going to actually be giving me the questions? Are we going to do them in written form, or are you going to speak them out loud?

[00:19:27.10] JENA WALLACE: I will speak them for everyone. Yeah, thank you, Brenden. This was such cool stuff to learn about and see what's developing and the potential here. We do have some great audience questions queued up, so I'll go ahead and get started, dive right in. What do you hope to see from this--

[00:19:47.56] INTERPRETER: Actually, first one second. Jena, I'm sorry, would you prefer for me to take the slides down while we look at the question and answer?

[00:19:56.17] JENA WALLACE: It's up to you. Yeah, your call.

[00:20:04.00] INTERPRETER: All right, that's better, better visually. Fire away.

[00:20:06.83] JENA WALLACE: OK, cool. I'm not able to see certain parts on my end as one of the hosts, so I don't have a great idea of what everyone else is seeing on their end. So whatever you think is best. So our first question, what do you hope to see from this AR technology within the next 5 to 10 years? Do you think society will be receptive to this new use of technology? Will other disabled people be able to use this?

[00:20:45.16] INTERPRETER: That's a great question. My desire and what can be done may be two different things. I would love for this to happen as soon as possible, of course. Of course, sign language recognition is still a work in progress and especially within AR and maybe not within 5 years, but possibly 10 [AUDIO OUT] about the pace of-- it's about the pace of technology and development and the prioritization within different companies. And whether or not they're pushing that, I can't really control that, of course. Of course, my goal is for the world and the sound context within any environment to be accessible.

[00:21:29.80] And so people now currently are able to have access to sound through transparency within earbuds and whatnot. I would love for that to be something I can benefit from in a visual environment as well. I do know that if somebody is screaming, I may not be hearing that. And I actually have a tattoo on my neck. I'm not sure if you can see it on camera. It looks like a bullhorn with a slash through it saying, I'm not hearing what's happening behind me. So I'm not trying to be rude necessarily. But if there is a visual alert that alarms me to the fact that there's noise or somebody's trying to get my attention, that's great.

[00:22:07.92] So the more important thing, though, with the technology I've looked at is that it looks natural. You don't want to have some funky, weird object on your face and look different. And something like this, it's just normal classes. You can see that there may be a display there, but more or less it looks like normal sunglasses. So this is my desire for the evolving technology.

[00:22:33.27] Already this year, there has been an announcement of some glasses where you can-- similar to what I just showed you. They look like basically normal glasses. They're becoming thinner and lighter and smaller form factors. A lot of the issues right now with the technology are with power consumption. And so really trying to get a lot of technology into a very small space is challenging.

[00:22:55.89] And you asked about other people with disabilities. I would think that this could be widely applicable because there are thousands of different use cases and applications here to look at. So if you could actually put technology into something that can move with your head, this could benefit any number of different applications. People who are not able to use their lower extremities or-- of course, you're not going to be able to have it on looking at a conversation for three hours, but it could be widely applicable.

[00:23:31.14] JENA WALLACE: Very, very interesting stuff. Our next question is pretty specific. Are the AR programs, like the Clerk ASL Interpreter active or just an idea?

[00:23:56.95] INTERPRETER: Currently, there are beta testing and use cases going on right now, use testing. And so there are some things that are functioning and usable right now. However, not all are in production. Some are in beta. Some are partnering with different companies, doing different beta testing. And things are improving along the way. The company that I showed actually has been working for three or four years. I really appreciate the effort that they have put in with brilliant folks working on this technology. But it's about getting it out there. And I know that there are other companies that have similar technology that I have looked at.

[00:24:39.08] Actually, there's one in France. It's called Ives, Ivies. I actually don't speak French, but Ives. And that particular company, it's more of a chat bot that does have sign language recognition. So you could, for example, sign, please call and then fingerspell the name. And it will make a phone call. So that is something that really fits my desire for this type of technology. Look at the options that you could use here with different types of things. So I'm looking forward to those types of things in the future.

[00:25:13.21] JENA WALLACE: Cool. Follow up for that, if that came out today, how much do you think this technology would cost for the average user?

[00:25:28.69] INTERPRETER: The avatar technology specifically, it would be the cost of the glasses or device that you're going to be using to access this AR. So it depends on the business use case as well. There's the business enterprise use case of it, which is a different scenario than your everyday user. But the back end could be potentially complicated and formatting and all of the things.

[00:25:58.19] And so that would be more of a business use case. But that's something that the cost expenditures of that would be on the business side of developing it. However, to me as a user, it may not be carried over as much. If the business has-- if a company has an app they want to put out, then oftentimes that's a use-for-free user experience, but it depends on the device.

[00:26:26.07] JENA WALLACE: So along that same lines, or at least at the topic of cost, how do you respond to a company when they say it will cost too much? And this is an audience question. They say, I find this becoming the norm, sadly, even making suggestions to larger venues, specifically movie theaters, private sectors, et cetera. How do you respond to when you get that kind of reply?

[00:27:04.70] INTERPRETER: The device itself, for example, the ones I mentioned in the movie theaters that are awkward, are also expensive. If the device can be cheap enough-- if you look at the methods that have been used for the last 20 years, they're not exactly cheap but also not effective. So I would say that, yes, there's convincing that needs to be done. If we allow folks to use their own devices, that's a huge benefit. Because, first of all, you're not sharing the same devices and ickiness from user to user. You can use what you prefer. It's a real win-win for the business who wants to provide it because they don't have to worry about providing the actual devices.

[00:27:48.89] So honestly, I do get those responses sometimes, oh, well, uh-huh-huh. If you have a device ready that you bring into the venue, it's like, hey, I've just got this here. Of course, there's a cost to connect the software to the glasses, but that is significantly less than adding on the cost of the device. We're looking at just the connection and the apps and whatnot.

[00:28:12.64] So of course, it is a problem that needs to continue to be faced that we all have heard, oh, it's too expensive. So we have to continue to advocate for that accessibility approach, that we're making these spaces accessible for everyone and that we want things not just to be audio based but also audio plus other inputs.

[00:28:33.13] So another thing is some movie theaters are very, very loud. And so some people may be accessing it visually or also just can't handle the noise of it. So there's really a lot of things to consider when you go into large spaces like this. It takes a lot of good, sound thought, and strategy, and a good price point, of course.

[00:29:03.64] JENA WALLACE: Another audience question we have, more about the specifics of wearing the AR glasses, what are the current practical limitations of wearing AR glasses? For example, do you run into battery or connectivity issues? Are they usable while playing sports or running?

[00:29:29.89] INTERPRETER: Sure, and of course, different glasses from different manufacturers will have differences. This one is about two or three years old. I typically wear it just at home because it is rather heavy. So this is more of a home use case. Current technology, I actually went to CES, the Consumer Electronics Symposium in Las Vegas. I'm sure some of you know of this. I went and saw some amazing glasses that are much, much better. They're lighter, better technology. But of course, the limitations do tend to be the battery consumption if it is wireless.

[00:30:04.48] There are a few that may go two or three hours, and then you have to charge it. If you know the Apple Vision Pros, those are wired. And so those will last-- if you are OK with a wired option, those will last much longer. Of course, it's impossible to have a perfect battery solution. If you see here, you're looking at trying to fit a battery into a very small space on the eyepieces. So if you're willing to have a lightweight wire, then that solves a lot of that. But battery consumption is a thing. Second is the field of view and how much information you can practically see and use within the world.

[00:30:43.52] So currently, a lot of the glasses have two displays right in front of each eye. And so some of them do have a wider field of view. But sometimes you want to see certain things, and there are limitations on the resolution within these displays. So it depends on where it is. You can't put too much, don't want to put too much. So those currently are the two technological constraints.

[00:31:12.57] It does seem that the newer technology that's coming out, they have improved some of these challenges. For example, the older glasses, the resolution was not good. It was hard to see. There are different approaches that can be used to-- for example, if you see these glasses, you can see the display. Just the way that it's positioned, some are better than others. Some of them are built into the lenses. Some are separately attached onto the lens. Some show things in a different way. So you get a little bit of reflection that comes off of the lens and whatnot.

[00:31:49.81] So there are ways to show in a better way that is more clear. But of course, it's not one size fits all. But the technology is getting better and better. Those are the two main limitations, are the field of view-- actually, a third one is fitting on your face. Sometimes they just bother your ears. So I have right here-- I've gone through three different settings to make sure that this fits my head. You want to be able to adjust it. So there's some things with head size as well.

[00:32:23.01] JENA WALLACE: Yeah, for sure. Kind of a nice follow up to that, we got a comment/question from the audience. As a member of the deaf community, I understand that many deaf users have expressed discomfort with theater glasses. How can we ensure that the AR experience is enhanced and more user-friendly to them?

[00:32:49.25] INTERPRETER: Sure, and it comes down to first thing is making sure that it's on and accessible and also easy to use. One problem with previous versions are that it's awkward, and the devices are large. And they're just not user friendly. It's not always clear. Sometimes they just don't work at all. The connectivity is an issue. So actually, related to the previous questions, connectivity to internet, to the cloud is also an important thing. And that's where all devices are really shifting to.

[00:33:22.34] So you can have a local signal, and then from a device that you have nearby, then send that to the glasses. And it's almost instantaneous. So if you're relying on just the internet and you're outside, it depends on if there's a signal available or not. So if you've got an on-device type model, it may be good enough, and then have a more robust model that may cover everything but is going to rely on Wi-Fi. So you could always have on-device model as a backup. But of course, thus far technology has not been perfect, but it is improving. But those are the two things. Connectivity is a thing.

[00:34:01.91] In movie theaters-- I think in general, if you remember when the iPhones first came out, the first user experience was, I can't do this. How do I text? How am I supposed to-- I used to have what's called a sidekick that had actual keys. And then you go to a flat keyboard list, touch screen. How does this work? I don't know. But if the technology is good enough and useful, then people are going to adopt it. And at some point-- look at where we are now. I can't imagine not being able to use my iPhone with a touch screen. So people will adopt it.

[00:34:38.23] JENA WALLACE: Yeah, that's definitely a great example. I also remember getting my first iPhone and just being so baffled that creating a voicemail was as simple as that and not a whole process. So I think definitely, same concept with this technology.

[00:34:59.94] So let's see what else we got here from the audience. Will AR glasses-- are they available in the USA only? And if not, do you know when they'll be available globally? They're asking specifically because they're looking to use one in their local sign language. Or is that possible now with the technology? Are other languages supported?

[00:35:34.14] INTERPRETER: For AR in general, of course, there's devices that are made worldwide, Europe, China, et cetera. However, the language access is a good question. VSL Labs is in Israel. I mentioned a French company. There are some other-- there's a Canadian company that I've heard of, Korea as well. So there are other enterprises working on this. It may not be limited to just American Sign Language for now. Of course, sign language access, at the moment, smaller countries may-- I think that Japan actually-- I'm pretty sure Japan has a sign language app-type thing available. I explained the phone call capability with the French company. So there are some things coming out.

[00:36:32.14] Of course, Canada has two different sign languages, LSF and also ASL, so we don't want to forget about that. But in general, I don't-- so again, one focus right now is focusing on a very large market, which is the American Sign Language market. And so companies that are investing in this are starting to invest in this space first. And eventually, that will trickle out into other languages. But it's getting the technology going first. There's investment maybe in other companies but maybe more limited. Of course, there's a larger market monetarily-wise in the US. And so I think that we also have the ADA and more accessibility options within the US.

[00:37:18.01] JENA WALLACE: Yeah, cool. Yeah, I agree. I think that's kind of like with captions, same theory. A lot of them start in the largest markets, and then they're localized from there. So it goes along with other access services in that space. Pivoting a little, do you think that the biggest equalizer for deaf professionals will be ASL-to-voice translation using this technology?

[00:38:07.72] INTERPRETER: Sorry, I was just looking at the question from the chat. So ASL-to-voice translation, perfect. Thank you very much. ASL-to-English, English-to-ASL. Thank you very much for your question. Actually, I know this person. So for deaf professionals, this is an excellent question. It really depends on the deaf professional specifically, for example, myself, maybe not. I rely heavily on English. I do sign, and this is important to have that provided. It really depends on the situation and trust issues and making sure that the message is clear. I may not trust AI to translate for me. I'm not sure.

[00:38:56.49] For example, right now, we just had a situation where the interpreter flipped some words around. We had to clarify. And sometimes when you're relying on technology, that may be something that gets missed and people have moved on. So if people who rely solely on signing and not as much on the written language, then that may be more of an equalizer. And it depends on the space they're working on, maybe their education versus something else. It really depends on a lot of specifics of what the message is. If you're relaying a message to higher-level leadership, this is really important that you get this right versus I'm just having a side conversation. So I'm not sure if that completely answers the question or not, but those are some of my thoughts.

[00:39:38.16] JENA WALLACE: Cool. Got to move on to-- there've been some questions about you specifically, Brenden. Can you clarify and remind us which organization you are working for and with?

[00:39:55.58] INTERPRETER: Sure, sure. So actually, I have three different lines of work right now. My current priority focus is T-I-V-E, TIVE, which is-- this is the sign right here. It's the letter T and then 4, the number 4, TIVE. That's my current biggest focus, which is a new VRS-certified provider that was just accredited in October of last year. It's new, and now it's the fourth company that is certified for VRS provision.

[00:40:30.21] The other thing-- really, there's technically two in one, but this is a fourth VRS provider. So I'm a director of product management, which means that I'm responsible for app development and fixing some technology and making sure that things are ready to be distributed to users. I wear many hats. This is a startup. You know how this goes. So I apply a lot of

different knowledge about technology and my experience to improve the overall experience for users there. That's my priority focus.

[00:41:02.15] The second one is VSL Labs, which I mentioned before, and advising VSL Labs on their technology development, and interpreter access, specifically. The third one is focusing on deaf family and children communication interaction. So there are a lot of deaf children with hearing families who do not have communication access within their families.

[00:41:27.08] And so this is not always the case, but there is a high percent of families who rely on the English language. And they have deaf children. There are some who are ESL families. And so then you have the barrier of speaking another language, such as Spanish, and then eventually moving that into sign language. So I work specifically in that space in addition to many, many other things that I'm interested for a variety of reasons. So yes.

[00:42:01.71] JENA WALLACE: Cool. Thanks so much. I just know that people are very intrigued by your experience. Little on the lighter side, but it's a fun question from an attendee. They ask if that is Super Mario All-Stars in the SNES. And for those who don't know, SNES is Super Nintendo Entertainment System.

[00:42:33.62] INTERPRETER: Wow, it's very small. Funny that you saw that. This one right here? I have all of them. I have all the consoles. I have 30 different consoles. I have all the Nintendos, all the Segas. I have-- can't remember-- Atari, all the things. I love Nintendo. I have actually more Nintendo things than anything else. I think probably 120-- look at all the NES games here. These are all the different ones.

[00:43:05.50] Actually, in terms of gaming, currently, I do a lot of Xbox, actually, all of them. Right now, currently, Xbox is a lot more accessible than the other systems. There are other things coming out, but in terms of current technology, it's really easy for me to use the Xbox in accessibility sense versus other systems. And then others are starting to catch up.

[00:43:31.32] JENA WALLACE: Yeah, that was a fun question. Thank you to the audience member who was asking about that. It's always nice to break up--

[00:43:39.57] INTERPRETER: Yeah, here you go.

[00:43:40.81] JENA WALLACE: --curious to talk with--

[00:43:41.19] INTERPRETER: It's all here.

[00:43:42.04] JENA WALLACE: Yeah.

[00:43:42.64] [LAUGHTER]

[00:43:43.88] INTERPRETER: Yeah.

[00:43:44.29] JENA WALLACE: So I'll move back to some more serious questions now. Given the collaborative nature of AR development. How can designers and developers ensure that AR accessibility solutions are codesigned with input from people with disabilities, such as yourself, and are reflecting the diverse needs and preferences and lived experiences?

[00:44:12.46] INTERPRETER: It's very important to find the correct company, the correct-- whoever is doing the research to connect with the users in the right way. There are some organizations that can be connected with. For example, I'm just going to give something off the top of my head. Since I'm a gamer, there's an organization called AbleGaming, and so they really interact with gamers to test out products and whatnot. Through this organization, companies can connect with them. I mentioned the XRAI glasses. I have been working with them for quite a while, advising and consulting so that they have the right perspective of deaf use cases.

[00:44:57.68] The deaf community, of course, must be involved when you're looking at technology for them. This is not a one size fits all situation. The community is so diverse, and you need things that fit different use cases. There are folks who are fully aural, who don't sign, and there are others who prefer to have sign language solutions primarily.

[00:45:15.21] So for example, when I was interacting and consulting with XRAI, there are a lot of things that just hadn't been thought of. And so it's really important to have involvement from the users in the community themselves and to make sure that there is the right research group who is interacting and making sure that they can gather that feedback and communicate across the board so that things are useful. That's a really important. And so I also have been part of that. There's some variety of panels that have discussed that here.

[00:45:47.84] JENA WALLACE: Yeah, for sure. It's funny you mentioned AbleGamers. We actually did a fireside chat with them about a year or two ago. And that was really fun to learn about what they're doing in the space. Maybe our tech support will drop a link.

[00:46:03.20] INTERPRETER: Oh, I didn't realize that.

[00:46:05.54] JENA WALLACE: Maybe our tech support can drop a link to that session because it was really awesome. Looking ahead, this is the big topic just with AI in general. Are there ethical considerations that you foresee from the widespread adoption of AI accessibility solutions?

[00:46:38.00] INTERPRETER: That's an excellent, beautiful question. I do see some potential issues with AR or AI usage and trying to automate everything. Of course, AI is a hot word right now. And of course, really, the concept behind it is machine learning. And so computers are not fully thinking for themselves right now, just saying. But that's a side issue.

[00:47:05.84] In terms of ethical considerations, in my work in the past, I have noticed people who will say, oh, there's automatic captions. That's good enough. And I have to let them know there's more to consider than that. I say, no, and I have to explain that it can't just be a default solution.

[00:47:27.93] And related to ethics as well, they will force on a deaf person to accept the technology that they have readily available, even though it may not be perfect. Computers are not perfect. Machines are not perfect. And if we are looking at a machine-learning solution versus a real human, there's a big difference there. And it depends on how much data can be gathered for the models and what kind of information is available there. There's a lot of considerations to be had here. Like, is the information-- is there enough data available to train on?

[00:48:07.59] There's the ethics of communication in general and equal access requirements. Like, oh, AI can do it. It's good enough. It's good enough. But sometimes I'm not going to accept for somebody to force me to use the thing that I know is not sufficient. And so I'm sure that you all realize that in the past, folks have said, well, AI-- AI not humans. They're just not. And so it's not going to work 100% of the time, and it's not going to fit every person. It's not going to fit every situation. There may or may not be enough information. So really, it depends on the person. You want to look at their overall life experience. And maybe the intentions are good, but it's not sufficient.

[00:48:51.37] JENA WALLACE: So how can stakeholders proactively address these ethical dilemmas to uphold the principles of equity, dignity, and autonomy for deaf users?

[00:49:08.62] INTERPRETER: So I think advocacy organizations, I think of one called Safe AI that's started up now. Of course, there are a lot of issues people are concerned about, for example, interpreters out in the world and making sure that people recognize and understand the current situation and that communication access is important. And the automatic interpretation systems may or may not be effective. So making sure that there's monitoring of that and that the right key people are involved and understand the situation.

[00:49:42.16] So we have to be "loud enough," quote unquote, that folks can see that. And the stakeholders and leadership from different companies, they may not realize. They think, oh, we're just going to make this decision, and it's great. So we need to make sure that there need to be regulations put in place and not cause problems for the folks downstream that are going to be using this. We do have ADA laws in the United States. And sometimes people think, well, it's enough. There's a law, so we don't have to worry about it. But this is old, and new technology is coming to the forefront, so we need to keep an eye on it.

[00:50:19.68] JENA WALLACE: So expanding on your point about user experience, as the field of AR accessibility evolves, there's a need to ensure that AR experiences are not only accessible but also enjoyable and empowering for deaf users. So how can user experience design principles be applied to optimize AR accessibility solutions?

[00:50:55.11] INTERPRETER: I will answer the best I can. User experience has to be-- sorry, the interpreter missed this. So if you look at the lowest common denominator of what is easily understood the fastest, then what we are eventually looking at is-- thank you very much for putting that in. Perfect example, communication access. So sorry, back to the point.

[00:51:39.19] The important thing is that we're looking at deaf users specifically in this session. So this is a visual language in that we're looking at technology that's able to understand a variety of folks who have very different, varied understanding of the world. They have different uses for the technology. And this applies to folks with other types of disability and technology in general, too. Is it easy to actually tap on your phone if you don't have a motor ability in one part of your body? And how are you going to use these smart devices in different ways?

[00:52:20.83] There's a lot of considerations there, and it's very important to make it as simple as possible to use for the user. Because one example, the VR headsets that have multiple cameras, for example, the Apple Vision Pro that can see your eye movements because of the cameras that are in the device. So it's important, even though the device itself is complicated, the user experience, the end-user experience is as simple as possible and seamless. And then that will be integrated into the world more easily. If there's a lot of barriers to use, then it's not going to be adopted as readily.

[00:53:02.13] JENA WALLACE: So how do you think AR accessibility initiatives contribute to broader societal shifts in attitudes and perceptions towards deafness? Do you feel it could foster greater acceptance, inclusion, and celebration of deaf culture and identity?

[00:53:37.25] INTERPRETER: It could. There are pros and cons with every technological advancement, of course. One example, may be off the point, but is cochlear implants. I have a cochlear implant. I don't use it currently, but I did many years ago. And it could impact how a group of people actually feel about themselves. And similarly, with hearing aid technology in the past, people felt that deaf culture was going to disappear. Of course, that didn't happen. So it depends on how aids and assistive technology can affect the identity of a group but also how that's integrated.

[00:54:24.52] And so really, it also depends on-- there's technology coming out all the time. And it's being integrated, and it could be applied in a situation. So the culture does adapt to that. And in general, it can improve some things for the better for people's lives. However, if the technology is good enough for users, and if it's seamless, and if something that people are going to use all the time. If not, then it's not going to be adopted by a community. Or it's not going to appear as useful. It's real life.

[00:54:58.67] JENA WALLACE: Yeah. Well, we have had a really great conversation. We have time for one more question, and then we will start wrapping it up. But first, given the fast-paced nature of technological innovation, how do you recommend staying up to date with the latest developments and best practices in AR accessibility?

[00:55:26.91] INTERPRETER: Whew, that's a tough question. I always feel behind. The design process has to be accessible from the very beginning. Any idea from the design process at the initiation going forward needs to consider accessibility. That's one important thing. I think that has improved some over time. I have noticed-- I've presented many times on similar topics. A lot of times people are very excited about the new hot things and products that are coming out. And they send these things out, and then they look back and realize, oh, gosh, we didn't really make sure that this was accessible for everybody.

[00:56:10.76] And so it's important to continue to emphasize that. And it doesn't even have to be the word accessible. It needs to be a product that everyone can use, universally useful so that anybody at any level is able to use whatever product it is that you're trying to send to the world. For example, there are a lot of technologies right now. You're looking at iPhones, many of you, right now, maybe. Is that accessible or useful for everyone? Potentially, yes.

[00:56:48.61] It's very key to keep that concept at the forefront, that everyone is going to-- you want everyone to be able to use your product. You don't want a suboptimal experience. Of course, I have advocated for this and evangelized to many different companies, including Meta when I worked there. This includes gaming. There are some gaming companies who now are considering this more. If you know Unity, the 3D world that's used in gaming, they actually decided to have a library provided for captioning. So people have it ready to go. If they're developing in Unity, it's very easy to be able to plug and play. So that's one great example.

[00:57:30.88] JENA WALLACE: Great. Thank you so much, Brenden, for this great discussion. And thank you everyone for asking some great questions, making some great comments in the chat.