Voiceover: This episode is part of a special collaboration between ACM ByteCast and AMIA For Your Informatics podcast, a joint podcast series for the Association of Computing Machinery, the world's largest educational and scientific computing society, and the American Medical Informatics Association, the world's largest medical informatics community.

Sabrina Hsueh: In this new series, we talk to woman leaders, researchers, practitioners, and innovators who are at the intersection of computing research and practice to apply AI to healthcare and life science. They share their experiences in their interdisciplinary career paths, the lessons learned for health equity, and their own visions for the future of computing.

                     Hello and welcome to the ACM AMIA joint podcast series. This joint podcast series aims to explore the interdisciplinary fields of medical informatics and AI ML applied to healthcare. I am Dr. Sabrina Hsueh. I'm the host from the For Your Informatics with the American Medical Informatics Association. I'm also co-hosting this series with the Association of Computing Machinery, ByteCast series. Today we have the pleasure of speaking with our very special guest today, Dr. Chieko Asakawa. Hi, Dr. Asakawa, thank you for joining. How are you today?

Dr. Chieko Asak...: Great.

Sabrina Hsueh: Just for our audience here, who is usually the new researchers and mid-career who are working in the interdisciplinary area between AI and medicine, I'll want to introduce your bio a little bit so they can understand your background. Is that okay?

Dr. Chieko Asak...: Yes, sure.

Sabrina Hsueh: Dr. Chieko Asakawa is a computer scientist who has been dedicating her career to developing innovative accessibility technologies. As a blind woman, she experienced firsthand the challenge of navigating a world designed for sighted people, and this inspired her to create groundbreaking tools like the IBM Homepage Reader, and more recently the AI Suitcase, which she will tell us more about. Dr. Asakawa's work has earned her numerous awards, including being named as the first Japanese woman to be an IBM fellow, and also her induction into the National Inventors Hall of Fame. She continues to serve as a leading advocate for accessibility and inclusion in the tech industry. Today, we cannot wait to dive in deeper with your journey and explore how your expertise can help inspire innovation in other domains. For our audience here, can you share a little bit more about your journey and why you are working in this current interdisciplinary area you're working at, between computer science and accessibility?

Dr. Chieko Asak...: Yes, sure. Let me first tell you about my personal journey. I became totally blind at the age of 14 after hitting my eye on the side of a swimming pool. I then

faced two obstacles. One is gaining access to information, and the other is losing my independence to move around. After many of life's twists and turns. I joined IBM Research in 1985. I was very fortunate to find the great potential of technology. I mean, I thought technology may help overcome obstacles. Since then, I have been working on accessibility research. In the mid-nineties, I was able to access the web within the lab. It was a kind of special environment. I was very much impressed, because I was able to access any information by myself, and I really wanted to help all blind and visually impaired have access to the internet.

It led me to develop the IBM Homepage Reader, first in Japanese, and later translated into 11 languages. Around that time, I found there is an accessibility conference in ACM called Assets, and I submitted a paper and it was accepted. Fortunately, I received the best paper out in 1998, the paper titled User Interface of a Homepage Reader, and this paper later received SIGACCESS Assets Paper Impact Award. Just this year, in 2024, I received SIGACCESS Award for Outstanding Contributions to Computing and Accessibility. I have been presenting and publishing papers at ACM Assets and CHI, and I can tell, presenting and publishing papers in these conferences have greatly helped increase the awareness and the importance of accessibility research and technology. I'm now very happy to see many colleagues all over the world who do accessibility research.

Sabrina Hsueh: Thanks so much for sharing your personal journey with us. The real invention always comes with a real need, but when you are doing this, have you ever confronted any challenges when you need to communicate your ideas to people in other fields, and any particular challenges you would like to share with us?

Dr. Chieko Asak...:   Yes, of course. I have faced many challenges to drive accessibility research. Let me talk about my latest challenge that we're facing right now. We are now developing the AI Suitcase, an autonomous navigation robot for the visually impaired, and confronting many challenges. We have yet to overcome them, but let me share our experience as a good example. Developing and deploying such a robot required a wide range of skills and expertise from many different fields. Building the robot involved not just advanced hardware technology like sensors, motors, batteries, tactile devices, but also software technologies such as image recognition, voice interaction, control systems, to name a few. When running pilot tests, it was important to cooperate with the organizations that manage urban spaces like shopping malls or operate local businesses like shops. In addition to actually using the robot in real-world environment, we needed to understand laws and administrative rules and work closely with government agencies, because our AI Suitcase is going to be tested both inside and outside, and outside usually has its own laws, like road traffic laws, things like that.

To ensure that the product or technology could reach end users, we also need to create a social system, including a business model to make advanced assistive devices accessible to those who need it. Faced with these challenges, we

realized that the cooperation and collaboration across disciplines and society were essential. By bringing together experts from different fields and forming partnerships with organizations, we believe we can overcome and move the project forward. That is my current challenge we are facing, and I'm ready to go through.

Sabrina Hsueh: The challenge sounds very complex. It's almost like you are starting a self-driving car business, and that you have to overcome the regulatory policy and go through all those testing environment preparation steps yourself. That's indeed very challenging. For newcomers who are coming to this field just now, they might not have the kind of resources and experiences you had to overcome those challenges. How would you recommend those newcomers to start? Is there any earlier career moves that you found very useful, that you would like to share with our next generation researchers and practitioners here in the audience?

Dr. Chieko Asak...: Yeah. Okay, so my first advice to newcomers is, if you are interested, no matter your background, no matter your field of study, jump in. In the case of accessibility, accessibility is related to a wide, ever-changing range of research. That knowledge and expertise, experience through accessibility will help you in your future career. In the area of human-computer interaction, an interdisciplinary field is essential, and of course, gender never matters. It is always good to understand human behavior, ergonomics, cognitive science, psychology, in addition to the computer science, so communicate and collaborate with people of diverse background. Importantly, understand the needs of target users. Talk with them, see the world through their eyes. Then, your idea will be useful and have more impact.

Sabrina Hsueh: How about for the mid-career professionals? Any additional advice you have for them to come into the interdisciplinary career, like the kind of accessibility research and application work you are doing?

Dr. Chieko Asak...: Yeah, so mid-career means they have already certain skills, so I would advise them to utilize their obtained experience and expertise when exploring interdisciplinary career. In this way, you'll be able to inject new, novel, unusual perspectives and professions. No matter if you are in your early or mid-career, I want to tell you that there is great potential in accessibility to contribute beyond people's disabilities to the general good. Because his mother was hearing impaired, Alexander Graham Bell dedicated himself to acoustic engineering. His personal experience led to the invention of the telephone. Be boldly curious and discover your passion.

Sabrina Hsueh: Thank you so much for all that advice. Our audience here will appreciate it. Going forward, did you have any more tips for people who want to dedicate their careers to improve accessibility?

Dr. Chieko Asak...: Okay, so first, please define accessibility technology or accessibility research for yourself. Second, I suggest you assume and imagine you have the relevant disability. However, your imagined experience is limited. Third, please talk to real users to understand reality, for example, what and how technology helps. Finally, please create a proposal based on your obtained knowledge and experience and discuss with real users. I'm sure you'll be able to find how technology can help them improve their quality of life.

Sabrina Hsueh: Thank you. Understanding our users is indeed the key to innovation. How about AI? Will AI help with accessibility research, or introduce more risk of health disparities, as what we have seen in other cases?

Dr. Chieko Asak...: That's a good question. Before the emergence of today's advanced AI, we as accessibility researchers studied how object recognition technology can help the visually impaired identify objects. For example, we worked on identifying drink cans, like if it either were beer, were cider, or water. It also involved camera aiming and centering without vision. Think about this prior research before current AI. We are almost going to laugh at how technology evolved, because the past few years have seen remarkable progress in AI, transforming this field entirely. AI is now being used as a tool to augment the vision of visually impaired people, expanding its potential applications. Currently, we can use AI to identify objects and surroundings with greater precision. It's really great.

Looking ahead, we envision advancements that enable automatic captioning for videos, including real-time footage. Yet, AI reading aloud everything could overwhelm visually impaired users. We need AI to filter and prioritize the information just as sighted individuals do. This would allow visually impaired users to access only the information they truly need in a seamless manner. This evolution is something I greatly look forward to, and I'm committed to advancing research toward that goal.

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Sabrina Hsueh: How about AI Suitcase you are working on? Can you give us a short intro about that?

Dr. Chieko Asak...: The AI Suitcase is a navigational robot for the visually impaired. It helps them reach a destination without hitting any obstacles or without losing their way. It is yet to be ready for public. We have tested the AI Suitcase with hundreds of users. Let me share their comments. "I feel independence that I'd never experienced after I became blind." "It's very easy because you just need to follow along." "I feel a sense of achievement of walking along and the freedom of not carrying a white cane." "I want to bring this robot back to my home," and,

I really like this one, "I want to give the robot a name like my guide dog." Another memorable comment was, "I feel comfortable walking naturally in city areas without being recognized as a blind person. I don't feel like people are watching me because I walk confidently." The feedback shows the technology allows people even with disabilities to be equally included, and thereby improve their quality of life. I can tell, accessibility technology can help people with disability live equally and more actively. That's my experience.

Sabrina Hsueh: What a great contribution. That actually brings me to my next question. When it comes to evaluating accessibility technologies in terms of their accuracy and their quality, are there any best practices you would recommend? Are there any other good examples you can share with us?

Dr. Chieko Asak...: AI is commonly assessed using standardized data sets. However, when it comes to accessibility, it is essential to evaluate AI in real life settings by observing how AI functions in users' daily lives. This is very important where the correct answer varies depending on the context. More importantly, the quality and accuracy of AI designed for accessibility can only be truly evaluated by humans. For instance, imagine an AI system that provides spoken descriptions of a landscape. Should it focus on informing the user about the movements of nearby people, or should it prioritize reading signs? The correct response changes based on the specific needs and context of the user. To address this, it is very important to provide opportunities for users to engage extensively with the latest AI technologies.

I have been concurrently serving as the chief executive director of National Museum of Emerging Science and Innovation. At our science museum in Tokyo, we have been operating an AI Suitcase on a daily basis. Furthermore, at the upcoming Osaka-Kansai Expo 2025, actually next year, we plan to conduct a large-scale pilot project. This initiative aims to gather substantial user feedback and evaluate cutting-edge AI technologies in real-world settings. I really hope you join us and experience our AI suitcase for yourself, and give us your feedback.

Sabrina Hsueh: To close out our discussion here, let us think about policy and government for a moment. Are there any policy changes you would like to see so as to ensure that AI can help improve accessibility safely and responsibly? If the ideal policies do not already exist yet, from your point of view, is there anything else that we should ask for change?

Dr. Chieko Asak...: Policy and governance changes are certainly important. However, without societal understanding, new technologies cannot be implemented within society. Therefore, I believe it is crucial to simultaneously work on raising social awareness and making necessary policy changes.

Sabrina Hsueh: How should we raise social awareness? Will any AI regulation and standardization effort help? In addition, as this particular podcast series aims to

also provide awareness on how collaboration between ACM and AMIA can work to help with different interdisciplinary innovations, is there anything our audience in these two professional societies can help?

Dr. Chieko Asak...:   Okay, so I'm not fully aware of how accessibility is being addressed in discussion on AI regulation and standardization. However, history clearly shows that consideration for accessibility is crucial. For example, everybody knows about the copyright laws for books. Because of this law, it allows for conversion, books into braille or audio formats. In web standardization, we have web content accessibility guidelines. These regulations and guidelines really contribute to increase the awareness and to adapt accessibility. I do hope some consideration of accessibility in making AI regulation. For example, some people show some concern in using wearable cameras or smart glasses in public environments, but it is going to be very helpful for the visually impaired to understand the surroundings, so it would be great if it could be used for accessibility purposes, with restrictions such as no storing data or using it for other purposes. I'm very sure we have many other examples, so I really hope AI regulations will consider such kind of accessibility needs.

Sabrina Hsueh: Thank you so much for helping us distill the need for accessibility consideration and social awareness in the context of policy and regulation. Now, before we reach our closing time, can you share with our audience here about your recent innovation, AI Suitcase? We heard so much about this in this episode. Please help us understand a bit more of your aspiration and bring it home to us.

Dr. Chieko Asak...:   Okay, so let me briefly talk about what the AI Suitcase is. The AI Suitcase is a navigation robot for the visually impaired. It helps users reach a destination without hitting any obstacles or without losing their way. People always ask me why it is suitcase-shaped. The idea came from my own experience. I travel along with a suitcase and a white cane, but carrying both suitcase and a white cane at the same time at the airport sometimes is too much, so I found a technique to use the suitcase as an alternative for the white cane. When I use the suitcase as an alternative white cane, I thought, "If we can integrate technology like perception, AI control, a lot of hardware into suitcase, it can be our travel companion." It made my travel life much easier, so the idea came from my own experience at the airport, but developing the suitcase needs a lot of expertise, like hardware technology, software technology, things like that.

I have been expanding the team, IBM team, and some companies for sensors, some company who does human detection, and construction company, to think about how we can distribute it to society. Together with collaborators, we have been developing the AI Suitcase. At Carnegie Mellon University, we first started prototyping it with students. The interesting function of the AI Suitcase is the handle. Our handle is not just a regular handle. Within the handle, we embedded some tactile feedback, so when turning right, the right side vibrates, and turning left, the left side vibrates. When we hold the handle, it starts moving, and when we release it, it stops. The user interface is very, very simple,

and we use a radar, like autonomous car, to detect obstacles and for localization. We have three depth cameras to detect humans and the distance towards the human, and inside of the suitcase, we have a GPU computer for the image detection, and we have a regular computer to handle everything like maps, voice interaction, things like that. We have batteries. It runs, the suitcase, for two, three hours. We don't use any network connection because when it is disconnected, it is very dangerous, so AI Suitcase always needs to prioritize the safety.

Maybe I can share my last message. Throughout my life, I learned we can make impossible possible by never giving up. When I lost my sight, I never imagined that such a life would open up for me decades later. I faced significant challenges in my life, but by not giving up, I was able to come this far. Make the impossible possible. Thank you very much.

Sabrina Hsueh: Thank you for listening to today's episode. ACM ByteCast is a production of the Association for Computing Machinery's practitioner board. AMIA's for Your Informatics is a production of Women in AMIA. To learn more about ACM, visit acm.org, and to learn more about AMIA, visit amia.org.

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