WE ARE ETH – Episode 48

Alexis E. Block, ETH alumna and Assistant Professor at the Case Western Reserve University

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[00:00:00] Alexis E. Block: I do think that the media tends to give robotics a very negative light. Uh, we've seen lots of robots taking over the world. So, one thing that we like to say as roboticists is that robots right now are actually very stupid.

[00:00:18] Susan Kish: In this episode, I'm talking with Alexis Block, an ETH alumna and assistant professor at the Case Western Reserve University. She also directs the Safari Lab in social and physical human robot interaction. This is the We Are ETH podcast, and I'm Susan Kish, your host. So Alexis, I gotta start by asking, what are the six principles of hugging, and is that the best name of an academic paper ever?

[00:00:51] Alexis E. Block: Thank you so much! I worked very hard on it. Actually, I ended up writing a follow up paper, and there are eleven huggly, we affectionately call them commandments, but they're really design guidelines to ensure that you can provide your hugging partner with a high quality embrace. So the 11 commandments are that

[00:01:14] Susan Kish: All right. Everybody needs to listen really carefully because it sounds like I could use this at home. So good.

[00:01:20] Alexis E. Block: A good hugging partner, we are specifying a robot here, a good hugging robot should be soft. That's number one. Should be warm, should be approximately human sized, should synchronize to the user's approach, should

estimate the user's height, and should adjust to all different sized users. So that's about first entering into the embrace.

Once you're in a hug, you need to be able to detect and classify any, what we have coined, intra hug gestures. So that's things like rubbing or patting your partner's back or squeezing them during a hug. You need to respond quickly. You need to be affectionate and occasionally proactive. You also need to be semi spontaneous with your responses or non robotic. And finally, you need to release the user on demand.

[00:02:10] Susan Kish: Okay. So there are a couple of words in that list that I'm going: how does this work for a robot? How is a robot affectionate? How does that work?

[00:02:18] Alexis E. Block: So we actually ran an experiment where we had participants performing these four intra hug gestures, holding still, rubbing, patting, or squeezing the robots back. And then we had the robot respond in different ways, again with those four gestures, to see how they preferred the robot would respond. And initially, we thought that people would really dislike when they were just holding still in the embrace, not squeezing, no other gestures, and the robot would suddenly start gesturing to them.

Uh, we thought they would think maybe the robot was malfunctioning because all of a sudden it started moving, but people actually really enjoyed when the robot performed these gestures seemingly of its own accord because it made them feel like the robot cared about them and like it was trying to comfort them. So that's what we mean by proactive or be affectionate.

[00:03:08] Susan Kish: And I loved your phrase, um, semi spontaneous, i. e. non robotic.

[00:03:15] Alexis E. Block: Yes, that was in the same experiment where we were evaluating the different potential robot responses to each detected user intra hug

[00:03:24] Susan Kish: Mm hmm.

[00:03:25] Alexis E. Block: Initially, we thought that users would prefer a robot that one to one mimics exactly the gesture that the user did. But when we actually tested that, we found that people disliked one to one mimicry.

They felt that it was perfunctory, or robotic, or like the robot was just doing exactly what they did. And it it didn't really, they would say it didn't really care about them. So what we found is that they appreciated a little bit of a semi spontaneous response. So for example, if they squeeze the robot, then they would sometimes like if the robot rubbed their back or if they rubbed the robot, sometimes it would rub them back and sometimes it would pat their back or that kind of thing, because they felt like the robot could then choose for itself and like it was more natural, more alive.

[00:04:11] Susan Kish: So, how do you write that algorithm? If they hold, then I'll pat. If they rub, then I'll squeeze. And I hold and rub, and then I'll pat.

[00:04:19] Alexis E. Block: So it's not exactly one to one like that. So we do have this somewhat spontaneity. So we actually took about, I think, 30 users and we have them experience all these different hugs with the different potential responses and we have them rate their response on how much they enjoyed that particular response.

So we had a matrix of these, um, average user ratings, and then we developed an equation to transform those average user ratings into probabilities. So we actually have developed a probabilistic behavior algorithm. So what's really nice about this is no two hugs with the robot are ever the same. So it's always fresh.

It's always new and it always feels. At least to me, it always feels somewhat genuine, even though we know that it's very much just down to math.

[00:05:05] Susan Kish: So, Alexis, one of the interesting issues is getting people to be comfortable with robots. Right? They're mechanical, they're, you know, we have lots of images in, um, everything from Matrix to the Terminator. You know, you've got mythical images around these things. How do you encourage people to communicate with a robot or to feel comfortable with a robot. How do you make that trust happen?

[00:05:29] Alexis E. Block: So I do think that the media tends to give robotics a very negative light. Uh, we've seen lots of robots taking over the world. So one thing that we like to say as roboticists is that robots right now are actually very stupid. They'll only do exactly what you tell them to do. And if a robot does something wrong, it's because you probably programmed it incorrectly. You programmed it, you told it to do that thing. So that's definitely number one, just reestablishing expectations and capabilities based on where we actually are today. The second thing is really emphasizing the direction and the reason for my work, which is that we are not trying to replace human- human connection.

We're trying to supplement when that connection might either be very difficult to get to ask for, or it might be impossible. And this could be for a variety of reasons. It could be geographical distance. It could be because of medical health reasons. It could be because of isolation or communication delayed environments.

It could be a variety of reasons why you might not be able to physically interact with another person. And that's why we're using robotics. It's not at all to replace interacting with a human. And I think that's definitely where some of the concern comes in and I absolutely get it.

And then the third thing I think is, goes back to the 11 hug commandments. While they were designed and developed for a hug, I think that they are more broadly applicable to just general design guidelines for good physical interactions. Yes, a robot that you interact with physically or socially should be soft, right?

You never wanna get harmed by a robot and those kinds of things. They do abstract more generally to, to principles for interacting with a robot.

[00:07:23] Susan Kish: What do you see as the future? What are they going to do? Right? How do they get used? What's next in their life story?

[00:07:30] Alexis E. Block: For this robot, I actually started with a pre existing robot called the PR2 from Willow Garage. That was my master's thesis. And I came up with the name HuggieBot. I thought it was really apt, succinct, and really expressed the idea. But when I started my PhD at ETH and the Max Planck Institute for Intelligent Systems, I decided that the form factor was really not ideal for a hug, so I needed to build my own robot, but I really liked the name, so I ended up adding the numbers afterwards, so the first version was 2. 0 of this custom robot, and then throughout my PhD, I went all the way up to 4. 0.

[00:08:08] Susan Kish: Why are hugs important? I mean, I know it intuitively, and I know I feel happier after a really good hug, but why?

[00:08:15] Alexis E. Block: So hugs actually provide us with a lot of, um, emotional and physical health benefits. So hugs can provide us with social support, they can actually strengthen our immune system, they can improve our oxytocin levels, which is the hormone associated with love and social bonding, they can alleviate our stress or anxiety by lowering our cortisol levels, and they can even lower blood pressure.

But if we don't have hugs in our lives, It can actually result in depression or mental health problems. We can have a lower self esteem. We can actually have lower pain thresholds. And it can also result in an inability or a difficulty in forming relationships later on in life if we don't get that important embrace early on.

[00:08:59] Susan Kish: What catalyzed your study of hugs? Because it sounds like you've been looking at hugs for quite a while.

[00:09:06] Alexis E. Block: Yes, I have. At the end of my freshman year, my dad passed away very suddenly and very unexpectedly. And throughout my undergrad, I wasn't really sure, what I was going to do, whether it was going to go into academia or go into industry, so I decided to kind of stay for a fifth year at the University of Pennsylvania and do a master's thesis.

It was like a trial, if you will, to see if I wanted to go into research. And the only thing that I could think about at that time was, how much I wanted a hug from my mom or from my grandmother. I've always been a big hugger, but, but that kind of life experience certainly really made that much more prevalent in my life.

The fact that I lived a plane ride away from the rest of my family, I felt very isolated and I felt like students around me at the time just couldn't really understand what I was going through, through, of course, no fault of their own. And I wouldn't want them to.

[00:10:00] Susan Kish: So you took your degree in mechanical engineering and you said, I have a problem can mechanical engineering solve it?

[00:10:07] Alexis E. Block: That's correct.

[00:10:08] Susan Kish: And that equals, I got to look at robots?

[00:10:11] Alexis E. Block: Well, when you put it that way, it sure sounds silly, but yes, that was my thinking at the time.

[00:10:16] Susan Kish: It's not silly, you just, you know, you took the tools that you had available and you applied it to the problem you had.

[00:10:21] Alexis E. Block: And I think that's been a general theme even now going into my faculty position has been, I take what's going on in my personal life and how I'm feeling and the issues that I'm struggling with and I try and take the tools and the resources available to me and the skills that I have and say, how can I solve this problem?

[00:10:40] Susan Kish: You had a wonderful quote on why you studied engineering. I read you translate innovative ideas into tangible solutions with a meaningful impact on society.

[00:10:50] Alexis E. Block: I said that? Great.

[00:10:51] Susan Kish: You did. You did. It was remarkably articulate. I thought some comms person put that into your press release. But no, that was your quote. Does that still hold true?

[00:11:00] Alexis E. Block: I definitely, I think so, maybe now more than ever. Now that I've started my faculty position and I'm in charge of directing an entire research lab, I, once again, I'm trying to use any kind of technical solution I can to have an impact on society, particularly my lab focuses on addressing mental health concerns and providing emotional support through emotionally intelligent robotic solutions.

[00:11:25] Susan Kish: So one of the other things that was fascinating about your career is you, where did you grow up, by the way, Alexis?

[00:11:32] Alexis E. Block: I grew up in Milwaukee, Wisconsin.

[00:11:35] Susan Kish: I'm from Ann Arbor, Michigan.

[00:11:36] Alexis E. Block: Oh, very close. My dad went to Michigan. Yes. He loved it there and he loved Ann Arbor. He used to sing me the Michigan fight song when I was a little girl, when I was crying to calm me down.

[00:11:48] Susan Kish: Hail to

[00:11:49] Alexis E. Block: the victors valiant, hail to the conquering heroes. Hail, hail to Michigan, the pins of the West.

[00:11:58] Susan Kish: Exactly.

[00:12:00] Alexis E. Block: Yup.

[00:12:02] Susan Kish: And so now you have to tell me why didn't you go to U of M? Why did you go to University of Pennsylvania?

[00:12:07] Alexis E. Block: I gotta tell you, my dad was very disappointed in that decision. He really wanted me to go to Michigan, but no, I think ultimately he was very proud that I went to Penn. My parents were very supportive of me and what I wanted to do. with my life. However, they were not convinced that I was going to be an engineer.

[00:12:31] Susan Kish: Why is that?

[00:12:32] Alexis E. Block: Uh, they were both in medicine. So I think it, it was the concern that if I went into engineering, I think the fear was that they couldn't help me. They also said, maybe a lawyer, maybe a doctor. We have people who, if you need a little help, we can help you figure it out. And, so it was very concerning to them, this unknown world.

So they said, choose a doctor. I was looking at very strong engineering universities, and they were like, maybe choose a school with a really good med school, a really good business school, just in case engineering doesn't work out for you. Just in case at the end of freshman year you want to transfer.

[00:13:11] Susan Kish: It sounds like you did your undergraduate work, right? You did a master's as a test case. Very medical, right? Let's do a pilot. And also you studied entrepreneurship

[00:13:22] Alexis E. Block: Did, yes, and math.

[00:13:23] Susan Kish: And math. You're smart. And then what caused you to apply to the ETH? Had you been to Zurich? Why the ETH of all places?

[00:13:32] Alexis E. Block: Never once. And.

[00:13:35] Susan Kish: You read a book? Hmm.

[00:13:38] Alexis E. Block: Of factors that went into that decision, one was that I had all my friends in undergrad, they had the opportunity to do these study abroad

experiences and they all loved them. They came back, it seemed like more worldly people who understood that there were other things happening, there were other things that were important, and I really wanted to get that experience.

And I think it's important for anyone to move outside their comfort zone and learn about other ways of life. So that was certainly one. The second part is my master's thesis advisor, Dr. Katherine Kuchenbecker, became the director at the Max Planck Institute for Intelligent Systems in Stuttgart, Germany, about halfway through my master's degree.

So for the second semester, she advised me remotely. And so I was thinking about what would it look like to do a PhD with you? And the Max Planck Institute is a research institute, so they can't grant degrees. So I would need to be affiliated with some kind of university. And I was looking at what kind of universities had partnership programs.

And ETH has a phenomenal program called the Center for Learning Systems, um, which is a joint program. They coordinate stays at each university with you. And they set me up with, I had two supervisors at the ETH, so that was phenomenal. And that ultimately seemed like a really good fit for me. And maybe a third reason was, I was really passionate about this project, this HuggieBot project.

I had spent one year on it and I felt like there was still so much more that I could do and that needed to be addressed. By coming to ETH and Max Planck, I had the intellectual freedom to study that project, whereas if I had gone to any of the American universities, I would have to research whatever the PI had a grant for. So that was really intriguing and definitely swayed me quite a bit.

[00:15:42] Susan Kish: That is fascinating. That's right. And a PI stands for a principal investigator, right?

[00:15:47] Alexis E. Block: Yes, that's correct.

[00:15:48] Susan Kish: Got it. So unless somebody had gotten a grant to do HuggieBot research, you were going to do something else.

[00:15:56] Alexis E. Block: Yes, and I knew that a PhD was a long commitment, and I wasn't sure if I wasn't truly passionate about the project, if I could really stick it out that long.

[00:16:06] Susan Kish: While you were there, you won a big award, uh, at the Max Planck, right?

[00:16:12] Alexis E. Block: Yes, at the

[00:16:13] Susan Kish: And you won awards for your papers. Can you talk a little bit about that?

[00:16:17] Alexis E. Block: Yeah, so, once I finished, I wrote my dissertation, and I defended, I was extremely honored and grateful that my, uh, professor at Max Planck Institute and then my two ETH supervisors agreed to recommend me for the Otto Hahn Medal, which is for outstanding, um, scientific achievement by junior scientists. So basically, we submitted my dissertation.

We had to find, I think, three or five external reviewers to actually do a thorough review and read of my dissertation and give back comments and either recommend or not recommend me for this award. I had to get letters and all that. And I was really grateful to be awarded that day. They award, I think, up to 30 every year for all of the Max Planck Institutes.

So there are many of them, I think maybe like 80 or something, in all different scientific disciplines. That was, yeah, one, and I'm very grateful. And then, I also won the best hands on demonstration at Eurohaptics, I think 2020. So that was very fun. We disassembled the robot. We drove it to the conference. We reassembled it. And then for three days, we were just demoing the robot. And I think it gave something like 234 hugs over the course of three days. A hundred and something people. I don't remember the exact

[00:17:40] Susan Kish: People came back for a second hug.

[00:17:42] Alexis E. Block: Exactly the point. That's what I wanted to mention is that, yes, people came back for more hugs. I kept track of distinct users versus, yeah, total number of hugs. Yeah. Several people came back again and that was good to know.

[00:17:55] Susan Kish: That is great. Can you just define haptics is a word I often read in association with, with robots, especially, what are haptics?

[00:18:05] Alexis E. Block: Yeah. So haptics is the human computer interface through the sense of touch. So there's lots of different ways to do that. But very simply, if you think about the way that you interact with your smartphone, that's haptics.

[00:18:17] Susan Kish: Got it. So how did you switch from Zurich to Cleveland? Why Case Western?

[00:18:23] Alexis E. Block: So before that, I actually did a quick stint in LA. I did, I did a post doc at UCLA, where I was advised by Veronica Santos. And then I went on my faculty interviews. And yes, I ultimately chose Case. I love it here. I'm the first hire into a new institute called the Human Fusions Institute. And

[00:18:48] Susan Kish: Not like nuclear fusions.

[00:18:50] Alexis E. Block: Not like nuclear fusion. So it's about ways that technology can be in the service of humanity, ways that we can connect with each other via

technology, ways that technology can enhance our human connections. And I think that really just perfectly aligned with my research already. And I felt like Case really embraced interdisciplinary research, which my work absolutely is.

So a couple other universities I was at maybe wanted me to downplay the social aspects of my work, maybe play up the mechanical, or play up the computer science, and Case really just embraced me for all that I am, and that really spoke to me quite a bit. And so that's, yeah, that's a big reason why I came here.

[00:19:34] Susan Kish: You have a joint appointment. Is that right?

[00:19:37] Alexis E. Block: That's correct. I, my, my primary appointment is in electrical computer and systems engineering, and then I also have a courtesy appointment in mechanical and aerospace engineering.

[00:19:49] Susan Kish: So let's talk about your time at the ETH. What was it about your experience at the ETH that you have now found valuable as you continue your academic and research career?

[00:20:01] Alexis E. Block: I loved the research environment. Everyone at the ETH was phenomenally focused and extremely intelligent, but also I found it to be a very supportive environment. So I, I learned a lot from the people in my lab, just sitting next to them. We would have stimulating conversations that would maybe inspire a new aspect research together.

I also loved the opportunity there to work with other students. So whether that was mentoring or I had the opportunity to be a teaching assistant and that really prepared me ultimately now for my faculty position where I'm creating and teaching a course. So I took the learning to teach course there, which taught me incredible teaching tools that I actually still implement today in the classrooms.

There've been a lot of aspects that really influenced how I maybe am as an assistant professor. And I'm so grateful for that opportunity.

[00:20:56] Susan Kish: One of the things that you mentioned as important to your work today is this interdisciplinary approach, right? You've got joint appointments. You look at a problem from a bunch of different angles. Was that something you also found at the ETH?

[00:21:13] Alexis E. Block: Yeah, absolutely. So I actually was in two different research labs at the ETH. So one of my supervisors was Dr. Otmar Hillegies, and he was in the Department of Informatics. And my other supervisor was Dr. Roger Gassert, and he was in, D-HEST I forget the acronym for that, but he ran a rehabilitation, uh, robotics lab.

So it was even during my time at ETH, I was splitting time between a very robotics focused lab, maybe a little bit more mechanical, I think it was also very health

focused and then also a computer science lab. So from, yeah, my beginning of my time at the ETH, it was interdisciplinary and I learned a lot from both labs.

And it was phenomenal having two different advisors during my time there because they both brought a really unique perspective to my research and finding a research direction that made both of them happy, made sure that I was doing something interesting and valuable.

[00:22:14] Susan Kish: Alexis, thank you so much for your time this morning. I really appreciated this and I look forward to seeing HuggieBots on college campuses across the country.

[00:22:24] Alexis E. Block: Thank you so much. Thank you for having me.

[00:22:27] Susan Kish: Delighted. I'm going to close by asking some questions that we ask all of our guests. So when you were a little girl growing up in Milwaukee, what did you want to be when you grew up?

[00:22:39] Alexis E. Block: I wanted to be an actress, particularly on Broadway, not in the movies. I did a lot of theater growing up, and I think it was maybe around high school when my dad sat me down and had a really serious talk, and he told me, you are Wisconsin level good. And I think he was, I think he was concerned that if I went to Broadway, I would be a singing waitress.

And he said, you should really go into science and just be an avid patron of the arts. And I've absolutely taken that advice to heart. I did go into science. I am a season ticket holder at Playhouse Square, which is the second largest theater district in the United States, only after Broadway. And I'm involved in Playhouse Square, yeah, and we do, um, volunteer and we raise money for the Arts District. I'm definitely involved as close as I can be without actually being on the stage.

[00:23:38] Susan Kish: What are you curious about today? What are you learning? What new field is sparking your curiosity?

[00:23:46] Alexis E. Block: So I've always done research with healthy adults. And of course, any time that you move away from healthy adults, there are additional considerations. safety considerations and other aspects that you need to be very careful about when you're working with more vulnerable populations. I've always been very interested in how research can help people with autism spectrum disorder or post traumatic stress disorder or anxiety or depression or even grief. So I'm moving a little bit more into these areas. But of course, doing so very carefully and very respectfully.

[00:24:28] Susan Kish: So it sounds like your father would be proud to hear that you're in the field of health,

[00:24:33] Alexis E. Block: I hope so.

[00:24:34] Susan Kish: You're using what you are good at towards that. Very cool. What books are you reading? What's either on your Kindle or on your bedside table right now?

[00:24:44] Alexis E. Block: So I just recently finished two very interesting books. One was the Nightingale by Kristen Hanna. Um, and that was a great book. I really loved it. It was a historical fiction during World War II, that followed two sisters in Nazi occupied France. That was phenomenal. I couldn't put it down. I think I read it in two days.

And the other one was The Dutch House by Anne Patchett. And it was a book about a family, and it revolves around this house where the children grew up in, and it takes place over a lifespan. Several decades, so it was very interesting too.

[00:25:24] Susan Kish: Very, very cool. And finally, when you were in Zurich and you lived there, what was your favorite place to go either for a walk or go swimming or have a coffee or whatever?

[00:25:36] Alexis E. Block: Without a doubt. It was the CAB relax, or as I like to call it, the nap room at ETH. It was the best place at ETH to take a break. It was calm. It was peaceful, it was quiet, there were little nap beds for you, and there was somebody working there whose job was to wake you up and tell you when it was time to go back to work, and it left me feeling recharged and more productive for the rest of the day, and I honestly think that every university should have that.

[00:26:12] Susan Kish: That is cool. So it's a space dedicated to those who power nap.

[00:26:16] Alexis E. Block: Yes. And they have.

[00:26:18] Susan Kish: so cool.

[00:26:20] Alexis E. Block: You don't know about this? It's my fa... you have to take off your shoes. You have to leave your keys and your phone. You're not allowed to bring them in. You tell the person at the desk what time you want to be woken up so there can't be any alarms. They just come and they gently rub your shoulder.

You get a fresh pillowcase to put on the pillow. You get a blanket. You get, like, a weighted eye mask, and they had a little, like, headphone set, and you could play, like, ocean noises, or rainforest noises, or you could just block them out. I mean, it was, I went there multiple times a week.

[00:26:55] Susan Kish: It sounds just great. Oh my gosh. I'm gonna have to check this out. That sounds fantastic. Alexis, thank you so much. I really enjoyed this conversation. I wish you all the best in your research.

[00:27:08] Alexis E. Block: Thank you so much.

[00:27:09] Susan Kish: I'm Susan Kish, host of the We Are ETH series, telling the story of the alumni and friends of the ETH, the Swiss Federal Institute of Technology.

ETH regularly ranks amongst the top universities in the world in terms of cutting edge research, science, and people. The people who were there, and the people who are there, and today. The people who will be there, please subscribe to this podcast and join us wherever you listen. And if you enjoyed today's conversation, give us a great rating on Spotify or Apple or YouTube.

And to close, I'd like to thank our producers at Ellie Media and at the ETH alumni. And thank you, our listeners for joining us.

Books mentioned in this episode:

The Nightingale by Kristen Hanna
The Dutch House by Anne Patchett