AI Ignition

Ignite your AI curiosity with

Cynthia Breazeal

Beena Ammanath: Hi, everyone. I'm Beena Ammanath, the executive director of the Deloitte Institute. And today on AI Ignition we are joined by Cynthia Breazeal, social robotics pioneer and MIT professor. She is the associate director of the MIT Media Lab, where she founded and directs the Personal Robots Group. Her work balances technical innovation in AI, UX design, and understanding the psychology of engagement.

In addition, Cynthia is the director of the MIT Initiative on Responsible AI for Social Empowerment and Education. She's also the dean for Digital Learning at MIT Open Learning. Beyond her work at MIT, Cynthia co-founded the consumer social robotics company Jibo, where she served as chief scientist and chief experience officer. Welcome to the show, Cynthia. I'm so excited to have this conversation with you today.

You are a pioneer in social robotics and human robotics and directions, but what was your journey? What was the catalyst that drove you towards a career in this field?

Cynthia Breazeal: It's great to be with you here today, Beena. I'm so excited to share my work and my story with you. In terms of the initial catalyst for the very idea of a social robot, it really happened when I was 10 years old, and I was watching the original Star Wars movie for the first time.

I see these incredible robots—and I can tell you that back during that time, the only robots I'd seen on television and movies were these automaton [types] that just did what you told them. And for the first time, I saw these robots that were full-fledged characters, had rich personalities, had emotions, and had relationships, not just with each other but with people.

Together, they're going off and trying to save the galaxy, right? That had such a profound formation of how I thought about what a robot certainly could be. Now, at 10, I knew robots like that didn't exist; I didn't think they would ever exist. But you fast forward—and I think looking back, you can always kind of tell a coherent narrative, but it doesn't feel that way, I would say, as you're going through it.

But when I was in college, I decided I wanted to be an astronaut, and I'm like, "OK, I want to be an astronaut." I knew I wanted to be a mission specialist, so I got a PhD in a relevant field. And I thought, "OK, space robotics," at the time rovers and space robotics were becoming, obviously, an important technology.

When I applied to graduate school, I applied to a lot of different programs, but I was accepted to MIT, and back in the day, it was called the MIT Artificial Intelligence Lab—now it's called C-SAIL, but back in the day, it was called the AI Lab. I was accepted into Professor Rodney Brooks' group.

Now, Rodney Brooks is famous for being the founder of the field of autonomous robots, and he wrote this really provocative paper called "Fast, cheap, and out of control: A robot invasion of the solar system," and it was all about how if you're going to explore planets like Mars, there's too much of a delay to operate the robots, so they had to be autonomous—and don't just send one big one, send lots of small ones. It was like the perfect timing of my interest at the time of thinking about space robotics and this group that was doing these autonomous robots to explore Mars. This was before Pathfinder, Sojourner—this is before NASA was thinking about this.

This was the paper, the group, and the work that put that idea out there. I can tell you that the moment I walked into the Lab, and I saw all of these small autonomous robots—and this was back in the day, in the '90s—they were all inspired by insects as natural intelligence.

I remember it was like having that Star Wars moment wash over me again where I'm like, "Oh, my God." If there was ever a place or a lab that's going to build robots like I saw on Star Wars, it's going to be a lab like this, or maybe this very lab! That just got me to realize that autonomous robots were a thing.

It was a real thing. And that got me along the path. It was literally the day that NASA landed Sojourner and Pathfinder on Mars. As you can imagine, in the field of robotics it was a huge celebration for everyone. I mean, oh, my God, what an accomplishment.

I remember thinking—now I'm a PhD student—I remember thinking, "OK, so we send robots into all of these incredible places: into oceans, volcanoes, and now we've even landed one on Mars. Why are they not in our homes?" This was the dream that we were all promised. But no one was really seriously working on this problem domain of completely autonomous robots being able to interact with everyday people, and that was the impetus.

I jokingly say it was kind of like the personal computer moment, where people used to have these extravagant, really big machines that only experts could use in computing, and then somebody said, "What would it mean to put a computer on every desk, in every home?" It was that one for me—it was kind of my Apple moment.

Anyway, the question then was, "OK, so what's that interface?" We already knew people tended to anthropomorphize these autonomous robots, and there's a lot of reasons for that. But basically, I thought the social interface is the universal interface. This is the interface by which people of all ages, from children, to our oldest citizens should be able to interact naturally with this kind of technology that we already anthropomorphize. This opened the question of, what does it mean to build a machine that's socially and emotionally intelligent? And that's the birth of the field of social robotics and human-robot interaction.

Beena Ammanath: It's fascinating. Two things came to mind as you were speaking. One is that in addition to Star Trek, the one that made me most aware of how robots can be in our homes was the TV show Small Wonder. Actually, not sure if you've ever watched it, but it was about this little girl robot who was part of this family.

Right now, there's so much in the news about companies creating robots for the home, and I look at it and say, you created this a while ago, and you even co-founded a company, Jibo. So, can you talk a little bit about what led to Jibo: Where does that stand now and how you are engaged with it?

Cynthia Breazeal: The Jibo story is a really fun story. I'm a professor at MIT, advancing the science and technology of this field of social robotics. And we are starting to advance the algorithms to the point where we can start to think about, what are interesting use cases and applications for a social robot?

We were always looking at, what are the latest kinds of technologies that we can use to build more affordable robots around? First, it was handheld computers that were still kind of slow and clunky; it was before the smartphone. But even then, we started to actually think about leveraging that because it was affordable.

Computing, networking, sensors: They're all getting smaller and more affordable. And then cloud computing was starting to happen, so we started to build robots around small, handheld computational devices. Then the smartphone came out, and I thought, now is the time you could actually build a pretty capable social robot experience, because it's the mechanics, sensing—it's display technology, movements, computing—it's all of those things, but at a mass consumer price point.

We were, at least I was, really inspired by—I mean, obviously we had seen the app ecosystems explode on mobile devices. The idea was instead of building a robot vacuum cleaner or a lawnmower that only did one thing, what if it was a platform—a social robot platform? Or, because in our research we'd been applying social workers to all kinds of areas: learning, health, you name it. If you can create a developer ecosystem around a social robotics platform with SDKs [software development kits] and so forth, that's the way to start the personal robots revolution, so it becomes a platform that people can infuse their ideas and their inspirations into.

That was the impetus for the idea behind Jibo; it was a mass consumer play—which, as you probably know, is one of the hardest things to create—around this idea of platform. So, we got seed funding, we started developing many concepts and ideations of this. We were told—we were thinking—maybe children or older adults were the sweet spots, because in a lot of our research there was something about this social-emotional interaction that was really sticky, particularly for that.

We were funded by some leading VC firms, and they're strongly advocating that we do a crowdfunding campaign—and this is still kind of the earliest days of crowdfunding debates. They tended to be catering to young, techno, hipster guys, you know? This is not the market for what we were like.

Why would we? Why do we need to do this? It's not the market we're trying to get the attention of. And they basically said, "Well, just so you know, the company pitching before you, and after you will have data from a crowdfunding campaign." So, we're like, "OK, we got the message, we've got to do this."

We chose Indiegogo. This is this summer of—I forget the year, but the punchline is, we did one of the most, I think the most, successful technology crowdfunding campaigns on Indiegogo, and this was the summer before Alexa was announced. When we were pitching, all the VCs were asking, "How is this compared to a mobile phone? Everybody has a mobile phone. They're going to control everything in their house on the mobile phone." We're talking about this far-field speech interface, right? In fact, that was getting a lot of pushback, too, so nobody knew that this far-field speech interface would revolutionize how people interact with not only technology, but AI every day.

Long story short, the appearance of Alexa complicated our story, but in many ways, I think it was—if a talking speaker is here, Jibo was further, is more advanced, further down the evolutionary story. Even though it preceded it, I think you probably had to go to the speaker on the smart devices app before you saw the investment in something as complex and interesting as a social robot.

The bottom line is, the company didn't make it, it was absorbed by another organization. So, I came back to MIT as a full-time professor. And Jibo is still a unique robot platform. We are the only university that can actually deploy social robots, cloud connected under I or B protocol—which is all about universities doing ethical studies, with fewer participants for long-term interactions, and a lot of exciting domains where the long-term interaction is with the AI, and building relationship, rapport, and working together collaboratively to long-term goals like learning, health, or emotional wellness. Getting a lot of really fascinating results that, again, keep reinforcing when people experience a technology—and in this case it's a personified AI technology—that supports a far more holistic human experience.

So, not just cognitive, data, or decision-making, but that plus the social and the emotional—that is what engages people in a way that they are even more successful with the technology than with an alternate technology that runs the same skills, but without all of those properties.

We're understanding a lot about what it takes to build technologies that can really deeply and meaningfully engage people of all ages, to help them achieve deeply important goals in their lives—and not just ordering pizza, not just getting the news, but "I want to be healthier. I want to be emotionally resilient. I don't want to become depressed." These are really, really deeply important goals. And this

Beena Ammanath: That makes a lot of sense. From a personal-life perspective, do you see social robots having a role in organizations or at an enterprise level? And what would that look like in any industry? What would be the impact of social robotics in an industry?

Cynthia Breazeal: In general, as AI continues to advance as a now conversational AI—it's exploding, right? Just as our ability to work with intelligent tools and technologies continues to advance, I think they're going to become increasingly collaborative, versus something that you just use. Something that may be increasingly more like a collaborative, or full partner, with you or with teams of

people; I think that's a trajectory we're going to continue to see. So these technologies—these conversational agents—are helping us make better decisions. Of course, everybody is already applying AI to do that, but just through new ways, forms of engagement. But I also think mental health is such a huge topic right now.

Every organization needs to be worried and focusing on, "How do I bring the best out of my people? And how do I make sure that they are able to be healthy, productive, and fulfilled?" We're in a time with the mass resignation; people are—especially in AI jobs—just swirling around, from company to company.

So, when you talk about retention, education, the training of employees, and thinking about mental health and wellness, I think these kinds of technologies that I'm talking about—these more socially, emotionally collaborative, engaging technologies—it's really about how do you build intelligent technologies that really help bring the best out of people, help bring the most out of people? That is the punchline. It's so many applications, from the practical decision-making to the emotional wellness and health.

Beena Ammanath: You are an established pioneer, but what's coming out is that you're also a very responsible pioneer. You're already thinking ahead. I've been following some of your recent work and you're focusing on this theme of living with AI and understanding the long-term impact of social robots specifically applied to education, pediatrics, well-being, health, and aging. So how did that responsible part come into the play? You know, because it's technologist—I'm a technologist by trade—and it's very easy to get fascinated by all the cool things it can do. And you had to force yourself to say, "OK, here are the ways it could go wrong. Here are some of the impacts that we're not thinking about, and we need to address it."

So how did—what was the catalyst for you to start thinking about it in a more, from a long-term impact perspective?

Cynthia Breazeal: It's been an evolution, and I think it's been an evolution also as the field—the field of AI is becoming acutely aware that, if not designed and deployed responsibly, AI can exacerbate inequality. It can actually do harm, and nobody wants that. So, first we were thinking about how can these AI technologies we create—really when you think about it, it's about promoting human flourishing. Our whole framework is about, how do we help people to flourish and to become who they aspire to be?

That's been the guiding light as we were engaging all these different communities, age groups, from early childhood, children attending at-risk schools where you want to bring more equitable high-quality education to them, to older adults who want to age with dignity, independence. And what we are realizing more and more was—first of all, people are interacting with AI every day.

It's on their phones, it's on the internet, and they have no idea they're interacting with AI, and we're building AI systems so when you learn, when you start to work with a robot coach to be healthier, it's like this is an AI system that is profoundly shaping ideas and behaviors, right? We're doing it to promote human flourishing, but it's like, holy moly, it's like there's another side—a darker side—to that point where people can manipulate it.

So we started to say, "It is no longer sufficient for people to be digitally literate; they need to be AI literate because they need to know what these systems are like." First of all, there was so much hype, it's hard to know what the heck AI is, right? They need to have a grounded understanding of what the ideology actually is, but they need to understand how they can responsibly use it as a user, as a consumer.

And you and I both know this field is not diverse or inclusive by a long shot. For equity, we need a far more diverse and inclusive future workforce. So, we started to develop a lot of curriculum around AI literacy, and then baked into that—baked that into that curriculum and this learning experience.

It's also inspired by Media Lab—we love constructionist learning, we love to foster learning through making, but now position learners as responsible designers. As they learn about any new method or technology, think about, learn about how you go through design processes to think through stakeholders, and implications of that. You become more responsible, ethically minded designers, and then also feel empowered that you can apply this technology to help address challenges and opportunities in your communities, because you can't just leave it to big corporations or organizations to solve all these problems.

What you also need is people in the communities, empowered and able to use technologies to solve problems that are meaningful to them. That's a future that that we're also trying to create through a lot of our AI literacy work.

Beena Ammanath: It's fascinating. Are there any key takeaways that you can share that are applicable for today's business leaders?

Cynthia Breazeal: We've been designing learning experiences, curriculum programs for kids, for K-12. We've actually been taking those same insights to develop AI learning experiences for leaders. We at MIT—"mind and hands" is our motto, right? We learn through doing, we learn through making, and why should leaders and managers only learn through lectures and discussion?

They should also learn by actually getting their hands on this stuff, trying things out, and making things with it. A lot of our stuff we do for kids is about non-coders, so people who have very sophisticated ideas and understanding, they're just not computer scientists yet. So a lot of these same tools and technologies we reapply, we frame them within organizational culture, organizational change, and behavior.

Things that are relevant to a leadership audit, but it's all about learning through creating, making, and discussing that. It's the same principles at work, but for an adult workforce and what we're finding—we're doing research around this, we're studying the efficacy of this kind of approach. They love it! Anyway, that's what we're doing for leaders when we think about innovating pedagogical approaches for how we can learn about AI—especially if you're having to lead teams who are trying to build solutions with AI. It's really important.

Beena Ammanath: One of the biggest challenges leaders face today is hiring and retaining talent. Can this same training be used to upskill, or reskill, that existing workforce? And how does that play out? What are your thoughts?

Cynthia Breazeal: Absolutely. I wear multiple hats at MIT right now. The social robotics work has been a lot about my research at the Media Lab where I direct the Personal Robots Group. I'm now also the dean for Digital Learning, where I'm one of the leadership at MIT's Open Learning Program. That's the group that brings all of MIT's educational opportunities to the world.

We have a lot of innovative programs in thinking about what's the future of workforce learning and education, where upskilling is really important? Whether you're somebody who already isn't as gainfully employed in the company and you want to be upskilled, or you're someone who is looking for a career change in something like data science or machine learning, how can we help, again, many more people access these jobs that you and I know. It's like data science, machine learning, AI, cybersecurity—there's all this demand to hire people in these fields, and we can't train them fast enough.

Particularly we think about the equity question. If you can make a far more equitable group of people who can achieve those jobs, that's all about upward mobility. A lot of what we're doing in Open Learning is opening up those kinds of programs all around many different fields. But I'm particularly passionate—partly because of my background—I'm particularly passionate about data science, AI, machine learning, all these kinds of topics, because I could be someone in Africa and be gainfully employed by a global company somewhere else.

Your ability to access apprenticeships, internships, and jobs is just—it's tremendous if you can show that you have the skills. So, thinking through customized learning trajectories with digital credentials that are verifiable and blockchain; we're trying to create a whole new approach. We call it agile, continuous education, whereby you can have smaller chunks that you can get credentials for so that you can stack these credentials, basically, in an adaptive way that helps you tailor yourself for a job that you want—versus, say, going for four years to university and amassing massive debt, and if you leave halfway through, you've got nothing.

We've got to kind of think about, "What do people want who are busy?" Money matters, they want to get upscaled. There's a lot of room for actually revolution in how we prepare lifelong learners in the workforce. That's what I'm really excited about in the open learning context.

Beena Ammanath: What's digital learning? Is it learning digitally, or is it more about learning digital skill sets that you need for today's world? I'm just curious about it, I'm hearing more about. What are you trying to accomplish in your role aspect of digital?

Cynthia Breazeal: The bottom line is at MIT, obviously we want to advance innovation, particularly in terms of experience and outcomes, so innovative technologies of all forms. And of course, many of those are digital today. How do we advance those experiences? There's folks at MIT, obviously a lot of places, AR, VR, social robots—just innovative ways of scaling high-quality learning experiences to people.

So, innovation is a big one. The other big one for us is understanding how people learn—the science of learning, the science of learning through and using these technologies in different formats. Right now, we kind of know, right? It's like we have in-person experience and that could be really good, we have a completely virtual experience, which is what we're doing now; it can be OK. Hybrid is the worst—but logically, hybrid should be able to leverage the best of both. So how do you do that? I think that's a big area of innovation as well. So, when you talk about a time in the race where you have [both] remote and going-to-the-office workforce, you have to collaborate.

I think this is one of the big challenges and questions of our time: How do we navigate this new world where many, many more people don't want to go into work every day? They want to be able to work remote, but you do have people going to work. How do you create those collaborative spaces and experiences, whether it's for creative problem-solving or brainstorming and innovation, or learning? I think this is a huge opportunity.

Beena Ammanath: And one of the things that is a side effect of building these kinds of learning opportunities is, it's not just to train for the current workforce gaps, but also to be more inclusive. As you probably remember, I started a nonprofit called Humans for AI, which is focused on getting more diversity and inclusion into AI, and my primary intention with that was to educate the nurses, the elementary school teachers, the people who may not become part of your workforce, but they still need to understand AI.

Cynthia Breazeal: They're going to use it. They're all going to be using it.

Beena Ammanath: They just read the headlines and they're so lost, and in the future, they might have to work on some of the regulations that come with that, and they aren't equipped. How are you thinking about access and inclusivity in AI? What's your goal with MIT Open Learning on getting more inclusive of people from different—even professional and educational—backgrounds?

Cynthia Breazeal: Within MIT the third hat I wear—I am also director of an MIT-wide initiative, it's called RAISE and it stands for Responsible AI for Social Empowerment and Education. It's basically about that cross-section of AI and learning. So, whether it's AI that helps people learn, or people learning about AI, a big mission of that initiative is diversity and inclusion.

And to your point, it's about AI literacy for society. Basically saying, let's assume within MIT, we got the graduate/undergraduate side of it covered. What about everybody else? The AI genie is out of the bottle, so how do we help educate children, because first of all, they're already using AI. But also, so they can be responsible users, to your point.

They're going to be voting citizens, and we want them to feel it's a tool that they can be empowered to make stuff with. Whether they're going to be innovating the algorithms as a graduate student someday, or whether they're going to be using it in arts, in agriculture, whatever—the big thing is just for them to be able to envision and be aware that, chances are no matter what you do as a profession, AI is probably going to be interesting and useful to you.

So, just building that awareness. And then in the workforce, absolutely. It's really about, you know, we have a whole bunch of different portfolios within Open Learning. Some is for, literally, the very beginner, just get you started; that's called the MIT Horizons experience. We have xPRO, which is really about people who are already in industries, technically minded, and wanting to upskill.

We have entrepreneurial bootcamps, hack-a-thons, by which you could be—again, not even in an organization or within an organization—and you want to have ideations about how you apply innovative technologies of all kinds—not just AI—but technologies of all kinds, around new products and services. So, a lot of offerings that we have that, again, bridge online and asynchronous learning, but also in-person collaborative experiential learning, and then increasingly we're starting to build relationships with other organizations for apprenticeships.

We're trying to create the whole learning journey and path by which you learn about it, you learn about the human skills. That's through a lot of in-person work, the human skills—communication, leadership, and teamwork. And then you apply it on the job through an apprenticeship or an internship, and then hopefully that gets you on the path to actually get that job.

We're trying to understand and create this new, agile continuous learning module that bridges asynchronous, digital, and on-the-job learning to try to help thread the needle through all those skills and abilities, which I think somebody needs holistically to be successful in the workplace.

Beena Ammanath: Now looking to the future, when you're successful with all these different initiatives, what does it look like? What are some of the implications for businesses across the world that you envision in the short term, in the next few years, versus the next five to six years—the long term?

Cynthia Breazeal: One of the things I would love—I would love to be able to look back and say we really contributed to—that would just be a much more innovative, entrepreneurial, in a responsible way, workforce. So yes, people will be going and joining companies, but I would love to see many, many more diverse companies started and founded, because for me as an entrepreneur, I thought, "I know what it's like to be an underrepresented group."

And then I became a founder and I'm like, "Oh, my God, it's like three times worse than what I even thought, and even worse for entrepreneurship, ideas coming from motivated, talented people, from a much more diverse group. I think that is super important.

I would love to see a world where people are able to really come together and bring the diversity of ideas. I feel like we are in this particularly challenging time when we're living in different universes. We can't even talk about the same thing in the same way.

Are there ways that we can help foster collaborations earlier in life, and maybe in our early lives, so that as you grow as an adult, you are able to have constructive dialogs, collaborate in meaningful ways, respect the perspectives that other people bring, to understand that there are big challenges we're facing in this world, and we need each other to solve them? I would love to see that be one of the big impacts that we have, and I would love to see that happen globally. So again, with the AI lens, we know that a lot of it is happening in the global north; I would love to see a lot more happening in the global south.

How do we go from access to equity? To me, that's a big one. And I would love to look back and see that Open Learning and MIT had an important role to play in that as well.

Beena Ammanath: Now, you talked about social robots in the context of employee well-being and being able to interact more. What's your future vision for a workforce where humans and social robots are peers, they work together? What are your thoughts on that?

Cynthia Breazeal: I am still so inspired by that Star Wars dream. I have to tell you, so much of our research and our science supports that, again, a more holistic, a more human-centered, a more humanistic approach, responsible approach, to designing advanced technologies. Including AI is going to continue to be critical, because it's all about what do we need as human beings to bring the best and the most of ourselves to make the right decisions, to solve the problems we want to solve, to open the opportunities?

It's all about what we need as human beings to be more—to be better. My vision would be that as our technologies and tools and experiences become increasingly intelligent, they are helping us to flourish and to tackle these huge challenges that we face, and that we feel that they become, not crutches—I think there's a real concern that people will become over reliant on these kind of technologies. But they're not crutches, they're trampolines. They empower us, to think better, more carefully, ethically, creatively, to make the things and the solutions that we're trying to create.

That's my vision. I think in a lot of ways, it will happen in many different experiences. In some case, we'll be using these intelligent tools as a tool. In some case, they'll be like a creative collaborator, motivator, something that helps coach us. I see all of these possibilities, and it really just gets down to, what is the value proposition of what you're trying to solve in this particular case that will guide all of the design decisions that you make?

Another kind of meta point of what we're doing is—the Media Lab, it's not only multidisciplinary, but it's appreciating that design is a huge part of making human-centered solutions that work. And so, AI is this field, where there's not a lot of design; it's a lot of algorithms, a lot of quantitative data, and I'm trying to show and infuse, if you really want to build impactful solutions that make a difference in the world—not just in academia but in the world—you need to marry it with design. I'm hoping that my work is at least, beyond social robots, is showing why that is interesting and important, and in fact, I think, critical.

Beena Ammanath: I love it. I love your optimism. I'm a fellow optimist; at the end, I do think we still have the power to shape it how we want. I am so glad that my audience got a chance to hear you speak about not only social robotics, but the implications, and learn more about the learning component of it.

So, Cynthia, how can people stay connected with you, and keep in touch with all the amazing work that you're doing? Where can they follow you?

Cynthia Breazeal: Certainly the web is a great way to follow a lot of our adventures at the Media Lab. So, you can just Google "Personal Robots Group" at the Media Lab," Open Learning has so many amazing programs. I definitely encourage people to check out Open Learning. And then raise.mit.edu. There's so much great work that's going on there. You can follow me on Twitter. I'm just Cynthia I'm just Cynthia Breazeal on that as well. There's a lot going on.

Beena Ammanath: And we'll include links to all your initiatives in the show so that our audience has access to it. Cynthia, thanks again for being with us on the show today, and thanks to our audience for tuning in to AI Ignition.

Cynthia Breazeal: Thank you. This is really wonderful.

Beena Ammanath: Be sure to stay connected with the Deloitte AI Institute for more research and insights. Take care.

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