



AI Ignition

Ignite your AI curiosity with Rana el Kaliouby

Developing Trustworthy and Inclusive Emotion AI

From Deloitte's AI Institute, this is AI Ignition, a monthly chat about the human side of artificial intelligence with your host, Beena Ammanath. We'll take a deep dive into the past, present, and future of AI, machine learning, neural networks, and other cutting-edge technologies. Here's your host, Beena.

Beena Ammanath (Beena): Hello, my name is Beena Ammanath. I'm the executive director for our Global Deloitte AI Institute. And today, on AI Ignition, I have Rana el Kaliouby, co-founder and CEO of Affectiva, credited with creating the category of artificial emotional intelligence or emotion AI. Her best-selling book, *Girl Decoded: A Scientist's Quest to Reclaim Our Humanity by Bringing Emotional Intelligence to Technology*, follows her personal journey in the Middle East, and move to the United States to become an entrepreneur, in tandem with her work on building emotion AI. Rana, I'm so excited to have you on the show today. You and I met a couple of years ago, and I see the amazing work that you keep doing. How have you been? And how has the last, I guess, year-and-a-half has been for you?

Rana el Kaliouby (Rana): Thank you for having me. It's been kind of a tough year, but also an exciting one. You may have seen in the news that my company just got acquired, so we got acquired by Smart Eye, which is a global leader in driver monitoring solutions for the automotive industry, and it's a great complementary to our technology and our team. So, new beginnings, new journeys. My book launched right in the midst of the pandemic. So that was kind of an interesting experience, too, doing a virtual book tour. So it's definitely been a busy year, but all in all, I feel like we're coming out of it, and I feel grateful. How about you?

Beena: I've been really busy. Met some amazing people through this show, and I have learned so much. I think what the pandemic has done, has really shown how dependent we are on technology. And why it is so important for us to get it right. So I am actually very grateful for the time that I've had with my

family and the time to reflect and also see how technology can help us all. So, Rana, let's start with your book. I read your book and it's a great story that needed to be shared. How does the book connect to your career and relationship to AI? And what was the inspiration for the book? Can you share a little bit about your book?

Rana: So the book *Girl Decoded* basically follows my journey growing up in the Middle East. As you know, I'm originally from Egypt. I grew up around the Middle East and finding my way, first at Cambridge University to study computer science and specifically machine learning. And then finding myself at MIT, starting a company. So it follows my personal journey and all of the challenges and obstacles I had to overcome, but interweaved with that is the story of the technology, which is, how do you build artificial emotional intelligence, and why do we need that? And what are the ethical and moral implications of that technology? So, it's really the story of my life. I tell people, I'm obviously still a work in progress, but I wrote the book because I really believe representation matters and we need different stories of tech leaders and business leaders in the space of AI. And I wanted to share my story and hopefully it inspires people who read the book.

Beena: Yes, I found it really inspiring, and I've seen it's already become a bestseller. So congratulations on your book. Can we touch a little bit on why do you think emotion AI is so important and what drives your passion around it?

Rana: If you think of human intelligence, our IQ, our cognitive intelligence is important, but our emotional intelligence is equally important. So people who have higher EQs tend to do better in life. They're better leaders, better partners, they're more persuasive. They're more likable. And I believe that that is fundamentally true for technology as well, especially devices that are so deeply ingrained in our everyday lives. Like our phones and our cars and our conversational interfaces. So I'm all about humanizing technology and marrying IQ and EQ in our devices. And I think that's going to make for really amazing human-machine interfaces, but more importantly, better human-to-human connections.

Beena: Can you share some use cases of where emotion AI is used? I've certainly heard from your prior talks from the automotive industry. Can you share a few examples where it's used currently?

Rana: The core idea is we use tons of data and machine learning and computer vision to quantify people's facial expressions, body postures and gestures, and the applications are numerous. You mentioned automotive, which is a place we're spending a lot of our mindshare. Imagine if your car could detect, with your permission, of course, if as a driver you're distracted or drowsy and it could intervene to make sure our roads are safer. I have a teenage daughter who's just starting to drive. I know you have a son the same age, and you worry for their safety. And imagine if the car could be on the lookout for if they're distracted or not paying attention and it could intervene, so that's one application. And then of course with autonomous vehicles and semiautonomous vehicles, we're starting to think about what else is happening inside the vehicle. Who are the occupants? What are they doing? Can you personalize the mobility experience to enhance wellness and entertainment? So that's a whole area. We also work with the Fortune Global 500 companies to help them understand the emotional engagement they have with their consumers. So we test a lot of content worldwide, and we're able to see when people are interested or when they're, I don't know, bored to death and they use that novel data to make media spend decisions.

Beena: What about areas like education or manufacturing? Like some of these industries are still so early on with their adoption of AI. Do you see emotion AI actually becoming a key factor as they look at adopting AI in these industries?

Rana: Absolutely. Take tech education, just the last year has catapulted the whole industry into adopting online learning systems and online learning platforms. And imagine if an instructor or a teacher could get a sense of the emotional engagement of his or her students and then be able to customize and personalize the learning experience. I think that would be really powerful. And I can share from my personal experience over the last year doing a virtual book tour. I've had to present many, many times to people and I can't see my audience, very different than when you and I met at a conference and we could actually see the people whom we are interacting with. Often, I'm just speaking into the screen and that's really painful and unsettling. And imagine if you had emotion AI aggregate the responses of the audience, and you could see a real-time chart or curve showing how positive or negative the responses are. I think that can be really powerful. So again, I think the last year has just highlighted the importance of technology, to your point, but it also made us realize that wow, we are like in V 1.0 of this whole wave of digital connections and human communication via technology. And we have an opportunity to take that to the next level. So I'm excited to see where this all will go.

Beena: And you mentioned it in passing, with the permission, because for emotion AI to work it needs to be able to study a person's face and detect that emotion. And I know you're a very passionate advocate for ethics, for data privacy, for preventing algorithmic bias. Can you share a little bit about what does bias mean in the context of emotion AI maybe for the automotive industry.

Rana: Yes, so when we started the company, we put a number of core values in place that have really served as our North Star and have guided our business strategy. And we'd like to think about it in two buckets, the ethical development and the ethical deployment of AI. So I'll start with the development piece, and for me the biggest concern around the ethical development of AI has to do with bias. And how do you mitigate data and algorithmic bias. So we use deep neural networks to train our algorithms, so that requires a lot of data. And it's not just the quantity, it's the quality and the diversity of the data. So, we feed it lots of examples of people smiling or frowning, and if it's mostly, I don't know, middle-aged white men that we use for training data, it's not going to work on people who look like you or I. And so, the diversity of the data becomes really important, and the best way to fix that is to ensure that the team that's designing and developing these algorithms is diverse. And in one case we have a whole data annotation team based in Cairo, Egypt, where I'm originally from, and a lot of them are women who wear the hijab. And their job is to watch all of these videos and annotate for smiles or frowns or eyebrow rises. And in one instance they said, "We've never seen anybody in this data set that looks like us." There were literally no examples of other women wearing the hijab. And it was unintentional, but because our team is diverse, they were able to highlight that this is missing. It's a blind spot we had. So, I just really encourage anyone in the AI space, whether you're developing it or you're a business leader that's being tasked to deploy it at scale, which I know a lot of your customers would be. I just encourage all of us to think about how do we mitigate bias and the best ways to just get a lot of diverse voices around the table.

Beena: What are some of the ways you've seen a company succeeding at bringing in more diverse voices to the table, especially in large enterprises?

Rana: For us it's really prioritizing it and being intentional about it. I'll give you an example. When we first started to really think through our machine learning pipeline and dissect where bias could be creeping in, I made that a goal at the executive level. So our bonuses were tied to not just driving revenue or raising money for the company, but also institutionalizing how we think about bias across the teams. And so, suddenly everybody was incentivized to think about this. Everybody from the CEO all the way to the actual machine learning scientists or product managers who are really building all of this. So I think it's important to be intentional.

Beena: Could you also talk about your experience as a woman in tech, studying and then building out your career, and some of the challenges that you have faced that might have been actually originating from bias, but also just bias against gender, but also against, in this situation, of being a woman in tech. What are some of the things that you've experienced?

Rana: Beena, I feel you and I need like a separate session to really cover all of that. So I've raised in total over \$50 million of strategic and venture funding. The first time I went out to raise money was in 2009, when I just spun out of MIT. My co-founder is a professor at MIT, Rosalind Picard. So I want you to picture this, like two women scientists coming out of academia, raising money for an emotion company, and our audience was almost exclusively older white men. There were zero diversity in the investor community. And even two years ago I was raising money from the automotive industry, again very, very male dominated. I will say, credibility is important and it was clear that we were domain experts in this field and kind of the world leaders in this space. And if there's one thing I learned from my co-founder Roz, it's perseverance. So we got a lot of noes, but she was just like, we'll just keep at it until somebody says yes. And so we persisted and we were able to raise funding from investors who share our vision, but that's made me really become passionate about not only supporting female founders, but also supporting female investors. We need a more diverse investment community to invest in new and different ideas as well.

Beena: That is so important. And we did have Roz actually on the show a couple of episodes ago or maybe it was just the last episode, but she is amazing. And you're so right, you can tell that you both are experts. Do you think there has been progress made in the past few years, because now I feel there is much more awareness and everybody is trying to move the needle. Do you think there has been a tangible shift just even in the past two years?

Rana: I think so. I'm part of an organization called All Raise, and it's a national organization that actually started in the Bay Area, but has now been deployed nationally, where we support both female founders and female investors. And they've gotten a lot of funding actually to just connect more founders and funders together and diverse founders too. So, I'm excited to be part of that. I do feel like there's progress. I feel like there's a lot more intentionality to drive this forward, but if you look at the numbers, they're still really depressing.

Beena: That is true, because there is such a big gap, it's going to take a while for us to show real progress. It might be moving just a little bit at a time. So, Rana, changing gears a little bit, you've been in this space. You are an expert, a visionary in the space of AI, and you've looked at different industries. Can you share what are some of the biggest opportunities that you see with AI, especially, not too far in the future, but in the next 5 to 10 years, where do you see AI really making a difference in all our lives?

Rana: So one area where I'm very passionate about is the application of AI and specifically human perception AI to mental health. We know that there are facial and vocal biomarkers of things like depression and anxiety. And I feel like we have an opportunity to deploy these algorithms at scale to really change the face of health and how we take care of patients. So that's an area I'm really thinking about, and I've always been passionate about it, but now I'm kind of identifying startups that I can support in this space. I truly believe that this technology is going to become ubiquitous, and sometime in the future it will be just ingrained and integrated into our conversational devices, our social robots. So I'm excited to see how that takes shape in the next few years. And then there's a number of enabling things that are happening, like synthetic data, for example, is an area that is really fascinating, and how it's going to accelerate the speed of innovation. So I'm looking at that space as well.

Beena: Do you think synthetic data can actually help us deal with some of the issues around bias?

Rana: Absolutely, because if you're, again, mindful about where your gaps are in the data set, you can literally just at a push of a button create new examples that fill that gap.

Beena: What are some of the examples or use cases that you see where synthetic data is currently being used successfully in the industry?

Rana: I mean, we're using it for our automotive work. So instead of bringing people into cars and having them wear baseball caps and glasses, and simulating different lighting conditions, we can literally just say, "Hey, we want 1,000 synthetic humans and we want them to be falling asleep in the car." And we can create that way more cost effectively and much, much faster than we would if we had to bring real people into the lab. I mean, we will always need to bring people in, like real people in for an actual validation data set. But through the iterative process of creating these algorithms, synthetic data is great.

Beena: And specifically for addressing bias, do you see that intentionality that you mentioned? Do you see us getting intentionally focused on building out synthetic data that is very diverse.

Rana: Again, I think it always starts with the humans who are designing all of this. So if you're blind to the issues of bias or you don't care, you're not really going to spend time making sure that your data is diverse. But if you have metrics in place on how to flag if there's bias in the algorithm, and then you're able to tie it all the way back to the data, I think synthetic data can be a great way to approach and solve that problem.

Beena: And I've also heard the notion of AI itself being used to prevent or mitigate bias. Have you seen any examples of those?

Rana: Well, there's a couple of startups that are starting to come up. It's not a trivial problem, because as you know there are so many use cases. So how can you have just one solution that applies to everything? I mean, you're the expert here, but you probably just need a framework to help companies think about all of that.

Beena: We do, we have Trustworthy AI Framework that I've built out since I joined, almost two years ago. It's right after we met, Rana, where we're looking at solving very holistically for any of the ethics

challenges from a technology perspective, from process, and also from people training, and making sure everybody is aware of what to watch out for. So, I think we need to get down to that next level of nuance to solve for these issues. And advances in things like synthetic data are so important because those become tools that we can actually use. What are some of the challenges besides ethics that you see in the advancement of AI applications in the real world? Ethics becomes a big headline, and I've seen that because it's one of the biggest risks. What are some of the other challenges that you think will stop us from getting to all the opportunities that AI brings us?

Rana: I would say the other side of this coin is the deployment of AI and how do you scale it in a way that's thoughtful, that respects people's privacy, that builds trust. There's a lot of mistrust around AI, unfortunately, and a lot of almost misconceptions around what AI is and what does it do. And I feel like again, as business leaders, it's our job and responsibility to educate the general public on, "it does this, but it doesn't actually do all of these other 10 things." And it's not going to become like the robot overlord anytime soon, I don't think anyway. So I think there's just a lot of misconceptions and misunderstanding.

Beena: What's the biggest myth that you've heard about AI that just made you like, given your expertise "No way. What are people thinking?" What's the biggest myth on AI that you've heard?

Rana: I mean, there's always you hear this narrative, that "Oh my god, we're going to build these emotionally intelligent social robots and they're going to take over the world, and then we won't have anything to do." And I'm like, no. We're years and years and years away from that, plus that's not even the goal. I always think about technology as being a tool to augment our ability. So even though I'm all about humanizing technology and building emotion AI, it's not to replace the human, it's to make us more emotionally intelligent. It's a completely different mindset. Do you know what I mean?

Beena: Yes, and it always comes up in the context of future of work, AI as a tool. What do you think is missing in the conversation around future of work in the narrative today? What are some aspects of future of work that we should be considering as technologists, as the AI people in this space? What is it that we can do to raise general awareness, but also in the specific context of people who are worried about their jobs going away? What are your thoughts, Rana?

Rana: I actually think that it's a very exciting future when it comes to this whole new world of AI, and we're already seeing it in our company, in our ecosystem. There are new jobs being created because we want to build these new technologies. So, I don't have the statistics handy, but there are millions and millions of new jobs and new job titles that are being created because of AI. That's super exciting, but you have to position yourself to be able to take advantage of these new opportunities, because of course there will be jobs that will become obsolete. So the key will be reskilling, retraining people so that they are best positioned to leverage all of this. It's exciting, right?

Beena: If you look back at history, it's always happened. The jobs, the roles, the actual work, the body of work that you do has evolved over time. It's not just with AI. Of course, AI is driving a big amount of change now, but I also think just the awareness, thanks to social media, just the kind of headlines that we put out or the way the headlines get propagated really fast is driving some of this hysteria around jobs being taken away or jobs changing, because it has happened. If you look back 100 or even 50 years

ago, the way certain jobs were done, there is no way those roles are being done the exact same way today. You take the simple doctors' profession, it has changed. They use tools now. A doctor I went to last week, she uses a real-time tool to capture notes of our conversation. So they're using digital technologies. Her role has evolved, but it gives the doctor more time to spend with me. So, I'm completely with you. One area that I think about, maybe one way to mitigate fear, is obviously the education. Providing the learning and making sure that everybody is on the same page, or at least has that basic AI literacy of what is AI. It's kind of going beyond the headlines to say these are the capabilities, this is what AI can do, and this is what AI cannot do. So I think that there is a big part of technologists is to really provide that education.

Now you've seen these jobs coming, were there any jobs or roles that have been created in the past few years that you didn't anticipate or you were like when you came to know that there's this job and you're like, "Huh, I didn't see it coming." I'll give you an example of one which caught me by surprise, and it's actually from a space that you're in, in the auto industry. Somebody forwarded me a job req which was for a sensor cleaner, and I'm like, "Huh, you just assume you put sensors to capture data, you don't think that you need a maintenance and a cleaning crew focused on just cleaning these sensors, because you are putting thousands of sensors and they need to work." So that was a big surprise for me. Are there any that caught you by surprise that you're like "Wow, I didn't see that one coming," or any anything like that that stands out?

Rana: There's this whole new job around, like a robot whisperer, and it's essentially somebody like a data scientist who's responsible for ensuring that as an algorithm, it could be a robot or not, continues to iterate and learn. That it's not going off the rails. That the learning isn't taking that device into a totally different direction. I thought that was really interesting. And I'm just fascinated by the interdisciplinary nature of AI. I think we need a lot more humanities folks to be involved in the AI space, because they bring certain frameworks to think about the morality of AI and its applications. And I thought that that was really interesting, like we need people, for example, to craft the personalities of these agents.

Beena: So true. In your first one, did you say data whisperer?

Rana: Yeah, I think I've heard it called like robot whisperer or algorithm whisperer, which I thought was really interesting.

Beena: I hadn't heard that. A few years ago there was this term of data janitor, which is a data engineer, or the engineers who work on cleansing, prepping the data for the data scientist to use. I had not heard of this robot whisperer. That is pretty cool, but yeah, I can see why you would need it and a trainer, like you're saying, a trainer which provides different personalities. Absolutely. What do you think will be the most in-demand job 10 years from now? What was it, a few years ago data scientist was called the sexiest job of the century. What do you think will be the next big job or role in the next 10 years?

Rana: I've never been asked this question before. I still think it's around the ideation. The set of people who are tasked with creating new ideas, new product concepts, and evangelizing them, conceptualizing them, turning them into a blueprint for how to build these things. I still think that is going to be in high demand.

Beena: So the mesh of the domain expert and the technologist, bringing those two and weaving in the humanist or the social sciences angle to make sure that it's the product that works from a technology side, it's needed in society, and then it works for humans. I love it. So bringing that combination together. It's awesome. What are your thoughts for large companies who are thinking about bringing in talent to build out some of their AI projects. What are some of the ways that you've seen companies addressing their talent shortage and gaps? What kind of trainings are out there or what's your observation on bringing in the right talent?

Rana: Well, the exciting thing, and I don't know if you're seeing the same thing, there's now—we've democratized access to AI and machine learning. You don't have to go through a PhD program like I did to become a machine learning scientist. In fact, my 12-year-old son, he just went through an AI training program where, for the final project, he built a natural language processing algorithm that can detect antirefugee sentiment in Twitter, on tweets. And I was like wow, and he was like confusion matrix and false positives, and I was like that was what I did at Cambridge doing my PhD and here he was coding this. So, I think that's amazing because it just means that more people can engage in this whole new world of AI and machine learning. So that's exciting.

Beena: Is that part of democratizing AI, and if you, and I'm going to totally date myself, when I started programming, this was way back, my first programming language was Pascal and I did COBOL and assembly language and things like that where you had to literally type in the words. And then came the era of ID, where there was autocomplete and the syntax checks were automatically done. You didn't have to go and look for a missing semicolon. Do you think that underlying technology, the tools that enable programming or building out these projects or solution, has evolved so much that there's truly a rise of citizen data scientist? And is that a good thing? Because we're just learning the nuances of building out AI solutions and putting it out into the world. How do you balance citizens data science with responsible AI in the world.

Rana: I think the nuances matter. So, there's even a number of startups that are popping up that are all about AI-generated code. GPT-3 is one example of that. So we're going to start to see more of that. I still think you need the domain experts, as you said, to make sure that we're doing it the right way. So yes, we'll have all these people who use it as a black box, but then we still need people who are able to dig in and really program and make sure that it's working correctly.

Beena: So true. Our audience is mostly CEOs and board members. What are some of your suggestions for CEOs and board members who are very early in their AI journey and are just beginning to roll out AI across their organization?

Rana: I think my biggest piece of advice would be to find low-hanging opportunities where you can implement AI here and now, and not wait for these big lofty AI goals. If you look across any organization in whichever industry, I bet you're going to find a number of places where you can implement AI solutions that are already in market. They've already been tried and tested. So having that road map and starting small with these proof of concepts and then growing from there, I think that would be my biggest advice.

Beena: And what about companies who are well ahead in their AI journey, have implemented AI across their different functions, and are using AI pretty much in their day-to-day business?

Rana: We sometimes reference these companies as AI first companies and for these companies, and we've experienced that at Affectiva, the pace of innovation is insane. So you can't just say, "Okay, I've built this amazing AI solution," and stop at that, because you've got to be continuously investing in your R&D and what's next. And I know that's where you spend a lot of your time.

Beena: I know, Rana, you came from academia with this brilliant idea and then you launched your own company, but it's very important to have that relationship between the industry and academia. What are some of the best practices that you've seen that work effectively when industries and academia engage? Can you share some best practices?

Rana: We still keep very strong relationships with academia. So, for example, we have a partnership with MIT's Advanced Vehicle Technology Consortium (AVT), where they have a consortium of all of the leading tier one and OEMs, as well as a number of startups, and we're part of that consortium. And we have access to incredible data, but also we're able to collaborate on challenging opportunities. For example, we're all about the interior sensing within the vehicle. They do work outside sensing, so how do we combine both modalities to get a better picture of what's happening on the road? So things like that. We can explore these forward-thinking thoughts that wouldn't make sense for a company like ours to do on its own.

Beena: So having a specific problem and then finding the right academic partner to partner with, as opposed to just going broadly and saying we want to partner on AI, which is a very broad topic. So having that focus is probably the best approach that works for you. Rana, this has been great. How can people stay connected with you? Where can they follow you? Can you share your social media handles or contact info?

Rana: I would love to hear from your audience. I would say read my book, *Girl Decoded*. It's available on many of the online book retailers and actual bookstores. And I'm also super easy to find on all the social media platforms, especially LinkedIn and Twitter, so please reach out and I'd love to hear from you.

Beena: Rana, thanks again for being with us on the show today, and I want to thank our audience for tuning in to AI Ignition. Be sure to stay connected with the Deloitte AI Institute for more AI research and insights. Thank you.

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