

Introduction

EMAR is a social robot designed to assess teen stress using a human-centered approach to engage high school students. Elin is working alongside Emma Rose, who is an assistant professor in the school of Interdisciplinary Arts & Sciences at UW Tacoma. She discusses the content and context of EMAR, how she has seen the field change overtime, and how she sees social robots advancing as time has progressed.

Bio

Elin Bjorling is a UW Tacoma faculty member working on a project called EMAR. She has a PhD and is a professional research scientist for the Office of Research and is also a clinical faculty in the school of Nursing and Healthcare Leadership at UW Tacoma. She has been using mixed methods and community based designing to study stress in adolescents.

Interview

Laura: Getting started, I was wondering if you could tell me a little about your current work.

Elin: We're working on project EMAR which is sort of the design and development of an Ecological Momentary Assessment Robot, which basically is a social robot that is going to eventually live in a high school and gather data from teenagers at school, during the day. That's the plan anyway. So, that's currently what we're working on. It's a big, long project: a long-term project, because using Human Centered Design we're starting from the very beginning of just so very basic concepts to try and understand what teens find engaging in a robot.

L: What are some of those things that you've found, they found, most engaging about the robot?

E: We're still kind of on this track of trying to figure out what they find engaging. We sort of know from the adult literature that things like gestures and voice and facial expressions of the robot are important, but also that the robot can interpret the participant's interaction, the participant's expressions and things like that. So, we're not quite there yet, but we are playing with eyes and voice to sort of see what they think about how it responds to them after they've answered a question. And I think we're kind of on the right track, although we recently got some feedback. We're trying to stay away from "creepy" because we have a lot of data that says that teenagers find robots, social robots especially, really creepy, like androids and things like that, so we're working really hard to make our, we're trying to stay in, we call it, "stay cute" because they want a robot that's cute. Not creepy. And we've been able to "stay cute" so far, but I just got my first bit of data last week that the teens thought the eyes on our current prototype were kind of creepy.

L: Oh no!

E: That's the first time I've ever heard that. They've always been described as cute, so now we're kind of like "uh, oh". *laughs* "What does that mean about our pixelated eyes?" So, we

might have to change that up, we'll see. We need more data to figure it out, but that's kind of where we're at.

L: Cool! How many years have you been working in this field with social robotics?

E: I am brand new to social robotics. My field is stress research, so I've only been just barely dipping into the social robotics since January of last year, so just over a year. I'm getting more and more educated about what's known and the literature and so forth, but my own experience is very short lived so far.

L: So what got you involved with social robots then? I can kind of see how that trajectory would work with stress and then stress of teens, but how did you get paired up?

E: Yah, it really just came out of, I've always used technology with teens. I've always used devices to capture data, so twenty years ago it was palm pilots and then it was cell phones and iPads and computers and things like that, but when I started realizing I wanted to capture a lot more data, and from an entire population, I realized a static screen was going to be too boring. They're just not going to engage with it after a while, no matter how interesting the app would be, and then I think just using cell phones. Teens are using their cell phones for just so many different things now that it is just hard to keep their focus once they're on a mobile device, so that made me start to look into what kind of a device could you be using to capture this data. And I came up with the idea of robotics because I'd just seen something about how engaging robots were for children and I thought, "oh I wonder if we could build stress measurement robot for adolescents" and if they would continue to engage with it, like "I wonder if that would be one way to get them motivated and engaged". And a colleague of mine connected me with a robotics student, actually, at UW, and that student told me, "there is absolutely no data whatsoever on teenagers and robots" and she had just looked into that because she was building a robot, this robotics device for children, and she said "I'm totally aware that the students, when they turn like eight or nine, there is no more data". And so she said, "you have to start this project to just to find out about robots and teenagers. Like even if your robot doesn't work, or whatever, it'll be worthwhile data to discover kind of what they like and don't like and why they would interact with it". So she was sort of like "do this no matter what, even if it fails" and I keep hearing that message over, everyone I meet is like "oh my gosh! You're looking at teenagers. Okay, you need to publish that. You need to find out more". So it's just a huge open area without enough data. So, I'm still hopeful that eventually we can build a robot that will be engaging and that I really can teenagers to interact with it overtime and get data from a high school in real time, but we don't know yet. We're not going to know for a while, but along the way, we're definitely going to gather some good data about teenagers and robots.

L: Yah. So what literature have you read about, if any, about the use of social robots in other schools though? Not in high schools, obviously, but say in elementary schools or things like that.

E: I have only seen a little bit of data around learning device robots. There's a small white robot that's like a tutor and so there's a bunch of data about those robots being kind of in the

classroom and kids getting to interact with them on occasion. I think there might be one other. The main thing I've focused on is longitudinal interaction, so not just a "one off", but kids building a relationship with the robot. And I think there was one other, I want to say like not-American, like maybe Scandinavian or something where the robot was at school to do something or other with them and they were surprised how quickly their engagement waned. So, like the first week everybody was totally into it and just like a couple weeks later nobody cared about it and nobody noticed it anymore. And I don't remember whose study that was, but I could find all these things if you guys were really interested. But I think it also spoke to just sort of what I haven't found, what I haven't seen is anyone's study of a robot, like built for children even, from a Human Centered Design perspective. In fact, I've seen very little Human Centered Design in robotics, which I find fascinating. So my guess with some of those studies is like well, you didn't build it for the kids, you built the robot and then you brought it in and the kids got bored with it because it wasn't really built for them. So that's my hypothesis anyway. But that's all I can think of in terms of like kids, or school robot, a robot in a school. I believe I've only seen two examples of that.

L: Okay. Thanks, sorry *laughs*. I was just curious.

E: Oh it's okay.

L: How do you think this, like, field has advanced over time, even just in the small amount of time you've been involved with it? Or looking at literature like across the years, have you seen any sort of patterns in the research?

E: Yah. I think, I mean I think it has advanced very quickly and I think it feels like social robots are going in two directions and one is what I really do think is this super creepy attempt to make humanoids. And there is just some huge progress on that front, trying to make very real looking humanoid robots. And then there's this enormous advancement in kind of social robots for other purposes, like the point is not to make them look human, the point is to make them either a pet or, you know, a household helper, or some sort of other thing. And I think things are moving pretty quickly on that front and I think the next thing that's starting to happen is sort of the use of facial software for facial recognition and software for facial expressions and things like that. We're now, we're going to start seeing social robots that are really responding to you and your interactions, rather than just being queued, and they can go online and they can talk to you about stuff. They're gonna start really actually seeing you when you're talking with them and I think that's going to make a huge difference. That we'll be able to...we already have the software, but I haven't seen a full blown robot that's done this yet, but that, you know, can sit and you have a certain expression and they can say, "oh you look kind of sad about that, when you said that story" or whatever, you know, "what is...". They can completely interact with you because they'll be able to recognize emotion. I think that's the next big front and it's not even technologically complicated. So I think that's going to really change, you know right now social robots aren't, in a lot of ways, the interaction with the person isn't that complex, so I can see

how that can quickly get more complex and the robot will be, will feel really more alive, I think, by recognizing emotions of the participants.

L: What are some of the advantages or disadvantages you see coming out of that then?

E: Um, I don't really see any disadvantages, but I am acutely aware of the need to recognize perhaps some sort of ethical platform about how we're building robots and why we're building robots. I saw recently someone suggested, again I wish I could just drop names and give you articles and things, but I can't think of anything off of my head today---

L: It's totally fine.

E: ---but I, um, I did see an article where a scientist really recommended that one ethical aspect of social robots is that we, that they do not look like humans, so that we don't end up in an era where someone can't tell if it's a human or not, because ethically that could be really, get really complicated. So I think about things like that, even in terms of our project. We have to think ethically about, we're capturing data from teenagers in a school. How could that data be misused? How do we protect their privacy, so to speak, or keep from influencing them in ways, you know we don't want to unintentionally create something by putting a robot in a school and you know. And again, in general, it seems pretty harmless, but I am also aware that nobody's done this before, so we have to do, go about it very carefully. But I don't see, I don't have, you know, there's a lot of fear about robots, social robots and robotics and I think a lot of that fear comes from the media, movies, and the idea of artificial intelligence, androids, you know, taking over the world. And it's not, it's not unrealistic, I don't think, but those aren't, you know. I think as long as I personally move forward with a very ethical basis for what we're doing and how we're doing it and... For instance, one thing we have to think about is if we implement a robot into a school and it's very successful at gathering data from teenagers and the school co-owns that robot, so to speak, could the school misuse the robot and use it for a purpose that we never intended. I think like any new tech you have to kind of project ahead and just kind of consider those possibilities and do your best to try to safeguard against them. So I do think like ethically everyone working in social robotics needs to really be thinking about ethics and potential for harm. I do that in all my research anyway.

L: Yah, especially dealing with stress, and things like that, it's easy to---

E: Yah and minors, teenagers, and so forth.

L: Um well kind of on a different note, but our research, our project, in particular is dealing with therapy robots

E: Oh okay like therabots?

L: Yah! Particularly with children with autism and I was wondering if you had read anything or heard anything about that.

E: Yah so you've probably come across like Cynthia Breazeal and Brian Scassellati.

L: Yah a little.

E: So I met Brian when he was here last summer I think. He's one of the people who said if you're looking at teenagers you must publish your work. But he presented a ton of data, of their data, from his lab, and I'm trying to think...he's at Yale. That's where he's at. I couldn't think where he worked for a minute. So his Yale lab is where he is and they did a lot, he presented a bunch of work, amazing stuff they've found with some of their different robots and autism. And again I can't think of the robot's name, but they had like a little, almost like a little dragon robot that kids would encourage the robot to cross water. That sound familiar to you?

L: Huh. No, actually.

E: And that's something I can easily look up for you. I have that paper. But, anyway, they, their team has a little robot that autistic kids would encourage the robot. They learned that the robot was afraid of water and the robot was put out on this little table mat and they would have to encourage the robot to cross the water. And after a certain amount of energy and encouragement it would do it. And for some reason they found that that interaction with the robot, it significantly increased social interaction. So autistic kids who normally didn't make any eye contact, when they were encouraging the robot and when the robot crossed this water, they would turn to the person in the room with them and say things like, "did you see that?".

L: Oh wow.

E: That sort of, what do we call that? Social-checking? Social---

L: Yah. Yah, social-checking.

E: Anyway, so they started, kids who never did that started doing that and I think they still were kind of like we're not sure why. It's still this area of like we don't really know exactly what's happening, but you can definitely see something happening. You know, some change happening. So that stuck out to me as one of the most profound things I've seen in awhile, in terms of autism research and social robotics. And such a simple, simple robot right? Like that robot's not doing any facial expressions, any anything, and yet it was making this huge difference. So I'm also aware that we might not need crazy, high tech robots. We, you know, some of these simple robotics ideas are making a huge difference so...But that's the one that always stands out to me as like an amazing effect of robotics in autism.

L: Yah. That's really cool. Is, um, what are kind of your thoughts on the use of robots as a whole for therapy, not just for autism, but for other things as well?

E: I understand, like with therabots and Paro, you know I kind of think about, like that, that makes sense to me, the concept of like the comforting nature of a fuzzy, roboty thing. I, my guess is, that, again I'm in teen health, and my guess is we're not going to get away with that with teenagers. I don't know why, but it's just sort of like trying too hard, but with older adults

and with children and even regular adults, I think that might work. And then there are some new examples of like psychotherapy robotics, you know, online robotic therapists, things like that where it's not, you don't have an embodiment of a robot, but you have a robot machine that is acting as a therapist with an individual. And they're showing that even that provides some therapeutic effect. I think I would still argue that there's some good data that physical presence is huge in robotics, and that's partly where some of the impact comes from. And Scassellati also mentioned in his talk this very brief study they did with undergraduates, where they brought them into like an office and they had to respond to either a robot, a robot on a screen, I think these were the conditions: a physical robot, a robot on a screen, so like a robot on Skype almost, and then just the screen with instructions, or maybe it was a person on a screen. And in each case, they gave them instructions and they were complicated instructions, not intellectually complicated, but emotionally complicated, and one of the instructions was to throw away some brand new textbook. Like to unwrap the textbook from the plastic wrap and then throw them like into the dirty garbage can. And with the undergraduates, they tried to like sneak, they tried to hide the textbooks and stuff from both screens, but when it was a physical robot, they actually went through with it. So that, you know. And there's another study where a robot was giving people misinformation in a test condition. There was a person versus a robot and this was like in some sort of fire scenario where they were telling the participants, "no, in order to like get out, there's a fire alarm, the best way to go out is this way. There's smoke coming from that way" or whatever. And there was a person versus and robot and all the people followed the robot instead of the person.

L: Oh! Interesting.

E: So I think that presence, that embodiment presence, is huge, but I also think it could be potentially dangerous. You know, it's another arena of ethics of why would you listen to a robot over a person. Like why do people make that judgement pretty easily? But it also, for us, means, in terms of teenagers, a physically embodied robot, rather than a static screen is probably more likely to be engaging. That's our guess. Like you're more likely to interact with something that is physically there.

L: Yah. Hmm.

E: Yah I just thought of one other study that he talked about too and now I can't remember what it was. It was not related to autism, maybe I'll think of it. Oh in terms of like therapy and so forth though, I do think, I mean I think there's huge potential. I think, I mean it makes sense to me that a person can benefit from an interaction with a robot for sure, that a person can feel connected and heard. And everyone's always like, "yah, but they need to be connected to humans" or "blah, blah, blah" and yah it's not instead of that, it's in addition to that. But the other thing we have data around is that when people are interacting with robots, they tend to be more interactive with one another. And that data comes from, there's a lot of data about robots that were placed in senior homes, long term, you know, where they were like robots just to help with reminders about medication and things like that. And in those cases the senior, you know, couple ended up connecting to each other much more so with the robot and actually didn't want

the robot to leave because of that. And it just led to more conversation, more stimulation, you know. You can think that's similar to like seniors getting a pet or something, it just leads to more interaction in general, and that also seems to be true in robotics. And you can imagine if we put a robot in a high school, you might not know the person standing next to you, but if the robot's there, you might start talking to the person next to you about the robot. So, it's that idea of like dropping something into the environment as a stimulus and then as a result, the individuals, the humans, in that environment start being more stimulated and more connected to one another.

L: Yah. That is really interesting. There is a little bit of research out there about using therapy robots for children with autism as more of a stepping stone, or like security blanket type situation, where just like that being there would help them interact with others as well, but that's interesting that, that's the first I've heard about it helping other people interact as well, but it makes sense.

E: Yah, yah. And I think the other thing they know is that with these learning robots, again I can't think of that little white robot's name. It's just kind of like a little, it's a little desktop robot, specifically for, I think it was built for math tutoring, and then it's been used for a couple other things. But, the hypothesis is, and this is true in, so I've actually done a little bit of research in actual pet therapy, like physical, real world, pet therapy, back when I was doing my Master's, but they know that, there's a program, we even have it here in Seattle, called Reading Rovers, where they bring animals to children and the children read their books to the animals instead of a person because reading aloud is really important as part of learning to read. And, the idea is, everybody wants to read to a dog. I mean it's just engaging and it's interesting and you get the feeling, as a kid especially, that the dog is kind of listening, but the thing you don't have, is you don't have any, the dog has no potential for judgement. And the child knows that and so that makes the child more confident. And so I think with this little desktop robot, they use it for mathematics and stuff, sort of as a tutor, and what they've found is, kids will take more risks. They will try more things when they're unsure with the robot than they would with a person. So with a tutor, a human tutor, they say like, "oh, I don't know how to do that" or "I don't really know that" and with a robot they'll say, "well, could it maybe be five?". And then the robot's like, "that's correct!", you know. So they're willing to take more risks because they don't feel judged. They don't feel like someone's looking at them and thinking about whether they're good or not good, you know that kind of thing. So I think there's also that kind of impartial trait that a physical robot has that can be appealing to people and I have some data that says teens are just going to be more likely to share data with technology than they are with human beings. You know when you invite teens to participate in something online versus talking to a person, they're just way more comfortable.

L: Yah that's true.

E: And they're way more honest, they say.

L: Do you think then, that, you said there are two directions that robotics seems to be going: the humanoid version and the more robotic-like. Would you say then that you prefer, you think that the more robotic side might be better for most robots? Or... what are your opinions?

E: I think that for, again there's Pepper. Do you know who Pepper is? The robot?

L: That sounds familiar.

E: Pepper is very popular right now. So Pepper was our first piece of data. Pepper's white. It's like four feet tall, has pretty big eyes and it's online. It's a connected robot, so it's online, and it can have conversations and tell jokes and it was really built as a customer service agent. So it can be programmed to...there are hotels in Japan where Pepper is at the front desk. And they just sold a whole bunch to the United States and there's a couple hotels and different companies that are going to be implementing Pepper. And it's been really, really well liked by adults. So when we showed Pepper, a video and then another time just an image of Pepper, the teenagers hated it, hated the way it looked. And my favorite quote was, "it looks more like a 'Peeper' than a 'Pepper'. Those are some creepy eyes". And, you know, things like that. They're suspicious of it, of its intentions and so forth. And then you show teenagers things that everybody agrees with like photos of BB-8 and R2D2 and Wall-e, and everybody agrees that Wall-e, BB-8, R2D2, they're not suspicious at all. There's no way they could cause harm; they're too cute. And so that's where we got this idea of like, okay, cute means you can't cause harm. If you're cute, then you can't be evil, like you don't have a counter side, you know. And so we just tried, there's also this robot from MIT called "Boxy", this very simple robot, and the teens just really liked it because it doesn't look like it does anything at all. It has like a hand-drawn face and it's just like a box on wheels. And everyone said, "oh, it's really cute. I really like it". So again our sort of "cute" data, as we call it, is driving us towards this keep it robotic-y looking, keep it boxy looking, keep it away from humanoids. Teenagers also don't like the animal robots. So I don't know about something like Therobot. We've never tested that. The Paro seal, it doesn't resonate with them. And then you show them some of the little animal robots that they use with preschoolers, they look like little gremlin-y type things, and the teens find those creepy too. Like they're like, "I would never want that in my room or in my high school". One teen told me that was "nightmare fuel", those little gremlin-like characters, like that was just nightmare fuel. So again, we've really been told to stay in this arena of like robot-y looking robots. You know, where they look like robots. Where the minute you see it, you're like, "that's a robot. That's not actually a dog, that's not actually a person". And my sense is they want that clear definition. The teens want to immediately identify this thing as tech, they don't want to be swayed in any way, shape, or form, that it might not be, you know. Even Therobot really does look like a dog. So my guess is, I haven't tested it, my guess is they would find Therobot creepy because it really looks like a real dog and then that creeps them out because it's not a real dog. Anyway, so we've just been sort of, we have enough data to tell us to kind of stay in this zone of BB-8, R2D2, boxy and then they really liked our first two prototypes that were just simple, simple, low-tech, boxy, desktop creatures. So, so far they said they really liked the look of it, like

the simplicity of it. And it's kind of benign, right? It can't take over the world because it's just a cute little box.