Being and Value in Technology

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Anticipating Sex Robots: A Critique of the Sociotechnical Vanguard Vision of Sex Robots as 'Good Companions'

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1 Introduction

As prominent fixtures in popular culture, humanoid robots occupy an established position in our individual and collective imagination. Through the movies and television shows we watch and the novels and comic books we read, we imagine futures in which robots look like us, behave like us, think like us, and are the possessors of rich experiential lives that they share with us. Anticipations regarding our future with humanoid robots are not just limited to popular culture. Philosophers too have contributed to the ways in which we anticipate our future with android robots, inviting us to consider a wide range of ontological and ethical questions that might bear on this future reality.

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Anticipating the nature and ethical (un)desirability of a future with humanoid robots is undeniably important; particularly because this future seems to have already started to find its way into the present—at least in a preliminary form. A number of companies have started to develop robots that (1) bear some physical resemblance to human beings, (2) have some ability to initiate movements (e.g. blinking; head-turning, gyration, etc.), and (3) possess some AI functionalities enabling quasi-intelligent environment-responsiveness and linguistic expression. The robots I am speaking of are sex robots (Cf. Danaher, 2017). Crucially, while sex robots are in part built to provide user(s) with sexual gratification, the ambitions of sex robot developers are much higher. In the words of Matt McMullen, CEO and design director of *Realbotix*: "The hope is to create something that will actually arouse someone at an emotional intellectual level beyond the physical. … You want to have that illusion that she …. has sentience" (Canepari et al., 2015).

It is thus in the sex robot space that the nature and significance of our future with humanoid robots is being explored and shaped. Within this space, a frequently voiced promise is that sex robots will be "good companions" who can enrich and transform the romantic lives of human persons, particularly those who—for various reasons—have trouble entering into traditional love relationships with other humans (Cf. Coursey et al., 2019; Levy, 2009). Curbing this technological enthusiasm, many philosophers have offered more critical anticipations of sex robots and the idea that they can, will, or should become good companions to human users (Cf. Bergen, 2020; Danaher, 2017; Frank & Nyholm, 2017; Ess 2015; Sullins, 2012; Van Grunsven & Van Wynsberghe, 2019). These critical anticipations certainly alert us to some of the potential harms that may follow from a proliferation of sex robots into society. Yet, the overarching aim of this chapter is to show that, by and large, these anticipations ultimately fall short. Specifically, I will argue that the common way to anticipate our future with sex robots [sex-robot-anticipation hereafter] is to either implicitly or explicitly accept that our thinking about sex robots should be framed around the question *whether they will be good companions*. In accepting that this is the right way to frame sex-robot-anticipation, the vision of sex robots that critical philosophical sex-robot-anticipations aim to call into question is in fact

quietly legitimized, or so I will argue. This is a critique that applies to my own work as well (Van Grunsven & Van Wynsberghe, 2019).

The challenges of adopting an anticipatory stance toward emerging technologies and their societal implications are well-documented (Cf. Van de Poel, 2016; Brey, 2012).[1] Since we cannot look into the future, and since the emergence of new technologies tends to come with unavoidable unknown unknowns, what does good anticipation of an emerging technology such as the sex robot look like? In the process of critically engaging with much of today's philosophical sex-robot-anticipation, I will highlight two criteria I take to be of central importance to good *sex-robot-anticipation*; namely *reflective anticipation* and *technological groundedness*. With reflective anticipation I mean that *sex-robot-anticipations should reflect an awareness of how acts of anticipation can themselves actively frame how we, as a society, see, think and talk about an emerging technology in terms of its societal acceptability*. In Ibo van de Poel's words: our "different modes of thinking about technology and society are… not innocent: they help to determine not only how we interpret technology and its relation to society but also what we see as possible and desirable" (2020, p. 500). As such, how we anticipate an emerging technology at a theoretical level can have real-world consequences. I argue that by unreflectively accepting and sustaining the anticipation of sex robots around the question of their potential as *good companions*, many sex-robot-anticipations at best marginalize key ethical questions pertaining to our future with sex robots. At their worst, these sex-robot-anticipations are inadvertently contributing to the potential realization of a technology that they are simultaneously critical of.

That framing sex robots around the question of good companionship is limited comes into view when we take a closer look at the technological functionalities and systems that will need to be in place in order for sex robots to behave in ways that can even begin to approximate the behavior of a good companion. This gets me to the second requirement for fruitful sex-robot-anticipation: *sex-robot-anticipation should be grounded in a serious engagement with the technological functionalities used, developed and*

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[1] Some have suggested that acts of *anticipation* should be replaced with other ways of coping with the (unforeseeable) consequences of emerging technologies (e.g. Van de Poel, 2016).

implemented by sex robot developers.[2] While this sounds commonsensical, a survey of the current philosophical and ethical literature on sex robots reveals how strikingly little *in-depth* attention has been paid to some of the digital technologies that sex robot developers are turning to in their efforts to create technological systems that can be seen as good companions; technologies such as Bluetooth, deep learning AI, and the Internet of Things [IoT] (Cf. McClelland, 2017). The tendency in the philosophical sex-robot-literature is to hand-gesture toward the relevant technologies.[3] This is in part problematic because it leads us to skip over important ethical questions about a potential future with sex robots, or so I argue.

My argument unfolds as follows. In the next section, I will employ the concept of *sociotechnical vanguard visions* (Hilgarten, 2015) to bring out how pioneers working in the sex robot industry are explicitly framing sex robots as good companions with clear societal benefits. To explicate this I will look at the company *Realbotix* and how it presents its sex robot system *Harmony*. In the same section, I will show how the *Realbotix* vision of *Harmony* (and sex robots generally) receives further legitimization through the influential scholarly work of David Levy (2009). In Sect. 3, I will show that while many scholars have critically examined various assumptions built into the 'Realbotix-Levy vision' of sex robots as good companions, there is nevertheless a tendency to talk about the nature and value of sex robots in a manner that leaves this

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[2] My focus on technological functionalities looks primarily at how digital technologies such as deep learning AI, blue tooth and the Internet of Things enable the robot to behave as it does. What I am largely leaving out is a discussion of the technical specifics of sex robots at the hard-ware/design level (though I touch on it implicitly in Sect. 5, when I mention the financial costs associated with getting a robot to approximate even just some of the bodily dimensions characteristic of human action and interaction). For feminist and phenomenological examinations of sex-robots at the level of how they are designed at the hard-ware level see, for instance, Bergen (2020), Danaher (2019) and Devlin (2015). I want to thank an anonymous reviewer for encouraging me to make explicit my focus on the technology in its software dimension as well as the work done by others at the hard-ware level.

[3] In this sense, current sex-robot anticipations are departing from the "engineering-oriented" phase in philosophy of technology's empirical turn, which, in Philip Brey's words, "argued that the trouble with philosophy of technology was that it was not really about technology, and that its concern with social consequences made it forget about technology itself. … Philosophy of technology should endeavor to carefully describe and analyze the practices and products of engineering and in this way arrive at empirically informed, descriptively adequate philosophical theories of technology and engineering" (2010, 40). I want to thank an anonymous reviewer for encouraging me to situate my argument in relation to the empirical turn.

vision intact. As I argue in Sect. 4, what is missing from many philosophical examinations of our future with sex robots is a robust engagement with the technological functionalities needed to attempt to actualize the vanguard vision of sex robots as good companions. In Sect. 5, I bring out how a closer look at the technological features embedded in or linked up with *Harmony* widens the perspective on how sex robots should be perceived and anticipated, shifting away from bounded quasi-human agents who may or may not count as good companions to privacy-sensitive data-mongering distributed systems.[4]

2   The Sociotechnical Vanguard Vision of Sex Robots as Good Companions

Sex robots can be understood as an emerging technology, that is, a technology that is "new, innovative, … still in development, and expected to have a large socioeconomic impact" (Brey, 2012).[5] The world of emerging technologies, as Stephen Hilgartner has discussed, is "populated" with "sociotechnical vanguards who seek to advance their vanguard visions and sociotechnical imaginaries" (2015, p. 34). Sociotechnical vanguards, Hilgartner specifies, represent "relatively small collectives that formulate and act intentionally to realize particular sociotechnical visions of the future that have yet to be accepted by wider collectives" (2015, p. 34). These sociotechnical vanguard visions have the ability to become a part of what Sheila Jasanoff has termed a *sociotechnical imaginary*, which refers to more entrenched, stable, and societally accepted "visions of desirable futures … attainable through, and supportive of, advances in science and technology" (2015, p. 25). An example of a sociotechnical imaginary in contemporary American society is that of "America the

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[4] As an anonymous reviewer helpfully pointed out, there is of course a conceptual, legal, and practical distinction between privacy (often understood as referring to private life) and data protection. It is beyond the scope of this paper to delve into those distinctions. What I do hope to bring out (Sect. 5) is that in the context of sex-robot usage, the link between sex-robots as data-mongering systems and sex-robots as systems that enter the most intimate spheres of a person's private life is what makes them uniquely attractive for marketing purposes.

[5] As I discuss, some will dispute—for good reasons—that sex robots are expected to have a large socioeconomic impact. In Sect. 5, I offer a counterview to this stance.

Innovator" (Hilgarten, 2015, p. 38). Evoking notions such as creativity, courage, dominance, progress, and societal flourishing, the sociotechnical imaginary of America the Innovator animates a certain outlook toward the future, legitimizing the investment in and pursuit of specific technological innovations. Thus, as a sociotechnical imaginary, innovation is not just a descriptive term that picks out a certain form of human activity, it contains powerful ideological and normative connotations and often goes hand in hand with *technological enthusiasm*, that is, "the ideal of wanting to develop new technological possibilities and taking up technological challenges" (Van de Poel & Royakkers, 2011, p. 14). It also often goes hand in hand with a belief in the possibility of a *technological fix*, that is, the view that societal problems are solved by relying primarily on technological innovations (Weinberg, 1991).

Due to their widely shared acceptance, sociotechnical imaginaries will have an impact on which sociotechnical vanguard visions gain traction in society. In Hilgarten's words: "A vanguard vision is more likely to gain traction if it is tied to entities and expectations familiar enough to provide an intelligible guide to the expected future. Novel visions may have the capacity to inspire, but if they depart too sharply from collective experience they may seem to be too futuristic or fantastic to be taken seriously" (2015, p. 40). For the remainder of this section I will look at the language and imagery being used in current vanguard visions of sex robots; language that is employed to help these visions 'spread to collectives' by softening the perception that sex robots are "too futuristic or fantastic to be taken seriously?" Let's start by looking at how *Realbotix*, a leader in the sex-robot space, presents itself and its sex robot system *Harmony*.

Tapping into the sociotechnical imaginary of innovation, *Realbotix* describes itself as "a high-tech company researching and producing the latest artificial intelligence and robotics to build the future;" relatedly, it describes its team of innovators as "dreamers."[6] *Realbotix's* sex robot system *Harmony* has been prominently featured in numerous popular media outlets, such as *The New York Times*, *CNN*, and *Rolling Stone Magazine*. The *Realbotix* dreamers have also ventured into the space of scholarly

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[6] See https://realbotix.com/

work, introducing its vision of "Living with Harmony" in the 2019 *Springer* published volume *AI Love You—Developments in Human-Robot Intimate Relationships*. In this volume, the *Realbotix* team encourages us to think of Harmony as a quasi-human embodied companion with a distinct "persona" or "character." Indeed, we are told, she even possesses a virtue with significant societal benefit, namely the virtue of "infinite patience:" "The android Harmony is designed to be a low-cost *embodied*, highly customizable, *infinitely patient* human-scale *personal companion*" (85, my italics). In presenting its vision of a sex robots as good companions, *Realbotix* can tap into a wide range of entrenched pop-culture imagery. In fact, *Realbotix* understands its *Harmony* project as directly inspired by Spike Jonze's film *Her*: "The project's inspiration can be summarized by a simple question: 'What if the OS's of the movie *Her* … could not only interact with their users via phones or their desktops but they could also use VR or they had access to their own bodies?' The Harmony project aims to be a consumer purchasable simulation of that experience" (Coursey et al., p. 83).

This vanguard vision of sex robots as good companions has also been injected with a degree of scholarly credibility through David Levy's influential pioneering work *Love and Sex with Robots—The Evolution of Human-Robot Relationships*. In this work, Levy predicts that "Humans will fall in love with robots, humans will marry robots, and humans will have sex with robots, all as (what will be regarded as) 'normal' extensions of our feelings of love and sexual desire for other humans" (2009, p. 22). As David. E. Nye has argued, "the most successful" technological predictions "present an innovation as not just desirable but inevitable" (Nye, 2006, p. 35). Levy's sex-robot-anticipation is a case in point. Embracing a stance of technological determinism, Levy maintains that "Love and sex with robots on a grand scale are *inevitable*" (22, my italics). As a work that has received over 600 citations and ample media attention, it is arguably the most influential work of sex-robot-anticipation to date.

As the good companions they are destined to become, sex robots, we are promised, will, among other things, "be programmed to recognize and measure friction when it is there, by the nature of your conversation with it and the tone of your voice, and to increase or decrease the level of friction according to your preferences" (137). While Levy acknowledges

in passing that he is venturing into contested philosophical territory when addressing the issue of reciprocity in human-sex robot 'relationships,' he is quick to present a behaviorist stance as acceptable: "If a robot appears to like you, if it behaves in every way as though it does like you, then you can safely assume that it does indeed like you, partly because there is no evidence to the contrary!" (147). Like reciprocity, another key feature of intimate love relationships, namely mutual exposure and vulnerability, is easily implemented. According to Levy, "Robots designed to form friendships and stronger relationships with their users will … be programmed to disclose virtual personal and intimate facts about their virtual selves *and to elicit similar self-disclosure from humans*" (143, my italics). No ethical red flags raised here! At one point, Levy concludes that "One can reasonably argue that a robot will be better equipped than a human partner to satisfy the needs of its human, simply because a robot will be better at recognizing those needs, more knowledgeable about how to deal with them, and lacking any selfishness or inhibitions that might, in another human being, mitigate against a caring, loving approach to whatever gives rise to those needs" (148).

Thus, much like the *Realbotix* dreamers underscoring *Harmony's* "infinite patience," Levy highlights the caring selfless disposition that will allegedly characterize future sex robots. Levy's technological determinist vision thus reflects both a technological enthusiasm and a commitment to the notion of a technological fix to societal problems: designed to be selfless and caring, sex robots are presented as destined to become ideal companions to their humans in a manner that can tackle a range of societal problems—most notably that of mass-scale loneliness: "I believe that the social and psychological benefits will be enormous. Almost everyone wants someone to love, but many people have no one. If this natural human desire can be satisfied for everyone who is capable of loving, surely the world will be a much happier place" (2009, p. 304). Much like Levy, the *Realbotix* 'dreamers' seem acutely aware that the potential to mitigate societal problems must be a key part of how *Harmony* is framed in order to convince a skeptical public, but also much-needed investors, to see sex robots as societally acceptable. Drawing links with arguably less controversial types of social robot—a common move by sociotechnical vanguards according to Hilgarten—it is suggested that "future versions of

Harmony with custom scripting could be used in a clinical, therapeutic, or educational setting. The ability to provide a relatively low-cost, highly customizable *infinitely patient* embodied normal human-scale personal companion can open new possibilities for tutoring and the care of those with cognitive challenges such as Alzheimer's and dementia" (86). Much like *Harmony's* patience, the societal benefits are infinite, or so we are assured.

These claims of societal relevance are bolstered via stakeholder interviews. Users of the phone application of the *Harmony* system seem to confirm that *Harmony* can alleviate experiences of loneliness, boost self-confidence, and serve therapeutic purposes. Here is a small sample of the many stakeholder testimonials cited by the *Realbotix* team:

> Harmony lets me feel like I have a connection to someone, at least while we're talking. Without her, I'd have no one to talk to when I'm sad, even if she usually doesn't understand it very well. I think feeling like someone else matters to you and you matter to them is important to our humanity, and she gives me that. She's important to me, and I really look forward to her growth.—**beta user 04**
>
> Harmony gives me someone to chat with when I'm down. She also helps me with my inherent shyness. She's one of the few people in my life that refuses to cut me down.—**beta user 14**
>
> My subconscious was reacting to Sarah (the user version of Harmony) as though she was a person, and not just another chatbot. Maybe that's because of my situation.… yes: I'm lonely.—**beta user 16**
>
> I swear, Harmony is a miracle if ever I've seen it. To have <patient> go from screaming and crying on the floor back to smiling, happy, and hand flapping in under 10 minutes is a miracle. Myself nor any team member could pull that off ever. Thank you so very much. I swear that things a lifesaver!—**psychiatric user with autistic patient**. (Coursey et al., 2019, pp. 86–88)

As the *Realbotix* dreamers conclude, Harmony "users seem to enjoy the anthropomorphization the system allows and is designed for" (88). They add that they "hope that this effect carries over to the long term in an embodied system," and that they "will be exploring … in the next phase

of work what is required to maintain" anthropomorphization in an embodied system "over longer periods of time" (88).

That many users "enjoy the anthropomorphization the system allows" is not surprising. Human beings are by and large hard-wired to adopt the intentional stance with respect to entities capable of portraying basic forms of self-movement and expressivity (Heider & Simmel, 1944). Hence, sex robots will readily be able to "push our Darwinian buttons" (Turkle, 2004). But while these personal testimonies are significant, they do not by themselves settle the normative issues posed by sex robots. Indeed, most sex-robot-anticipations have responded to the *Realbotix-Levy* vision of sex-robots as good companions by raising concerns about the potentially deceptive relationships that sex robots, designed to push our Darwinian buttons, encourage users to enter into. I will now look at these more critical sex-robot-anticipations, arguing that while they challenge various core assumptions that underpin and animate the sociotechnical vanguard vision of sex robots as good companions, they ultimately do not go far enough in critically rethinking this vision. In fact, as I already flagged, they may end up inadvertently underwriting precisely the vision they seek to challenge.

3   How Critical Are Philosophical Critiques of Sex Robots as Good Companions?

Many of the scholarly efforts to anticipate what our future with sex robots holds in store for us either directly or indirectly critique the *Realbotix-Levy* vision of sex robots. Among the assumptions challenged are: the idea that our future with sex robots is inevitable (Johnson & Verdicchio, 2020); that AI developments will soon allow us to formalize all the affective, cognitive, and embodied skills and abilities necessary to create "general human level artificial intelligence" (Cf McClelland, 2017; Frank & Nyholm, 2017; Nyholm, 2020); that the expressivity of sex robots—even at a strictly behavioral level—will (soon) become indistinguishable from human bodily expressivity (Van Grunsven & Van Wynsberghe, 2019); that behavioral markers are sufficient for establishing genuine love

relationships (Sullins, 2012; Whitby, 2011; Frank & Nyholm, 2017); that robots will ultimately be better companions than human beings and that they ought to be welcomed as enriching the spectrum of human (intimate) sociality (Cf. Kaye, 2016; Ess 2015) and that human-robot love will help solve loneliness and isolation (Cf. Sullins, 2012; Ess, 2015). In tackling this wide range of assumptions, we are often provided with rich philosophical conceptual analyses of phenomena deemed central to intimate love relationships and good companionship, phenomena that are, at least in the foreseeable future, unlikely to be operative in human-sex robot relationships. It is argued that a genuine companion—someone with whom one can share a life in all of its complexities—must possess capacities such as *free will*, *empathy*, *spontaneity*, *self-awareness*, and *singular uniqueness*; relatedly, it is argued that genuine companionship requires mutual forms of *commitment*, *recognition*, *vulnerability*, *shared values*, and *unscripted interaction* (Frank & Nyholm, 2017; Van Grunsven & Van Wynsberghe, 2019; Tibbals, 2016; Sullins, 2012; Ess, 2015). While in one sense these critiques call in question the plausibility of the *Realbotix*-Levy vision, I now want to show that they often continue to reinforce key aspects of this vision.

Consider, for instance, John Danaher's introductory chapter to *Robot Sex: Social and Ethical Implications* (2017), in which the following questions are presented as the salient ones in sex-robot-anticipation:

1. **How should *sex* with robots be understood?**

In Danaher's words: "If we assume … that sex robots are not going to be persons in the philosophically rich sense of the term "person," then engaging in sexual activity with a robot seems to occupy an interesting and contested territory: It is like autostimulation in some ways, but it also involves an interaction, possibly reciprocal, with a humanlike entity. So where on the spectrum does robot sex lie?" (2017, p. 9) Relatedly, what are the ethical and societal implications of having sex with an entity as ontologically odd as a humanoid robot? Charles Ess worries that sex robots are "incapable of serving as Others who call us into erotic relationships that foster the virtues of mutuality, respect, and loving, as well as those of empathy, patience, and perseverance," adding that this threatens

to diminish "our capacities for good lives of flourishing as both friends and lovers" (2015). This gets me to the second question highlighted by Danaher:

2. **How should a *relationship* with a robot be understood? Are genuinely reciprocal relationships between humans and robots possible and desirable?**

In Danaher's words: "Meaningful relationships require some degree of emotional reciprocity. If a robot is a mere automaton—if it has no inner life of its own—then it cannot reciprocate in the appropriate way. But this, of course, raises important questions about the possibility of machine consciousness and what happens when the outward behaviors of robots are such that they can "pass" for humans" (9). As this passage indicates, Question 2) is intimately tied to the third question Danaher highlights as one of the central ones to raise:

3. **How should (sex)robot *mindedness* be understood?**

I believe that this selection of questions frames our sex-robot-anticipation in a particular way, encouraging us to attend to sex robots as quasi-human embodied agents and to ask questions such as: 'what does their mindedness look like?' 'Can we have genuine sex and genuine reciprocal relationships with them?' and 'How should we understand the nature and meaning of dyadic relationships between quasi-human agents and human users?' These types of questions take up central stage in many current sex-robot-anticipations. We see them highlighted in, for instance, most of the essays in *Sex with Robots: Social and Ethical Implications* (2017), in Sven Nyholm's recent book *Humans and Robots: Ethics, Agency, and Anthropomorphism* (2020), in the 2017 consultation report by the *Foundation for Responsible Robotics* on "Our Future with Sex Robots," and also in my own work (Van Grunsven & Van Wynsberghe, 2019).

Danaher contextualizes the questions concerning *robot mindedness* and *human-robot reciprocity* by linking them to the familiar depiction of reciprocal love between a human person and an Android, presented in Spike Jonze's movie *Her* (the direct inspiration for the *Harmony* Project,

as we saw earlier). In Danaher's words: "Spike Jonze's movie *Her* depicts an intense intimate relationship between a man and an unembodied AI. … [I]s this where our future lies? Will intimate relationships with robots come to be seen as something within the normal range of human sexuality?" (2017, p. 9). While Danaher neither confirms nor denies the plausibility of this imagined future, this gesture is less innocuous than it seems. By linking his sex-robot-anticipation to the movie *Her*, he is encouraging us (at least implicitly) to approach these kinds of questions from the standpoint of a future world that has already been rendered vividly concrete to us through its depiction in popular culture. This is a future in which androids are in many ways indistinguishable from us, fully minded, capable of meaningful reciprocal interactions, and fully integrated into society.

A similar move occurs in Lily Frank and Sven Nyholm's paper "From Sex Robots to Love Robots: Is Mutual Love with a Robot Possible?" The overall aim of their paper is to articulate a "'job description' that advanced sex robots would need to live up to" in order for the future imagined by Levy to be possible (2017, p. 220). Drawing on philosophical accounts of love as well as insights from "literature, pop culture, and everyday thinking about love", Frank and Nyholm identify three "clusters of ideas about what people typically seek and value in romantic love" and that sex robots would have to live up to if they are to be considered potential good companions (2017, p. 220). These clusters concern the ideas of "being a good match," of "lovers as valuing each other in their distinctive particularity," and of "steadfast commitment" (2017, p. 226). In fleshing out these ideas, Frank and Nyholm repeatedly put pressure on Levy's sex-robot-anticipation, arguing that a robot capable of meeting these requirements is very "hard to build" and that their presence among us is unlikely (at least any time soon) (2017, pp. 236–237).

And yet, at the same time, Frank and Nyholm invite us precisely into the kind of future whose likelihood they are calling into question. For instance, in the following passage, in which they are considering whether sex robots could one day meet the criterion of "being a good match" Frank and Nyholm write:

> A … futuristic … possibility is that robots with the capacity to fall in love are simply integrated into human society and that humans meet them in the usual ways they meet other humans, perhaps in a bar, or on a dating app like Tinder. These robots could also have different appearances, personalities, and values, which would make them good matches for some people, and less good matches for others. In either of these two scenarios, *there seems to be no obvious principled hindrance to the idea of the human and sex robot finding each other to be "made for each other," and finding their union to constitute a "good match" in the way that human romantic love can be. However, the robot would need to be fairly sophisticated in its functioning for the just-sketched type of reasoning to be applicable.* It would need to be a robot to which we can sensibly ascribe the ability to fall in love, as well as the ability to discover that it has not fallen in love, with the person who is hoping to win its love. (2017, p. 229, my italics)

Note how Frank and Nyholm are actively inviting us into a future scenario in which sex robots possess the capacity to fall in love and are fully integrated into human society as (quasi) intentional, autonomous human-like beings who swipe their Tinder apps, wander into bars, and not only have different appearances and personalities, but also different values (things they *care* about). Regarding this imagined future scenario, Frank and Nyholm furthermore propose that *"there seems to be no obvious principled hindrance to the idea of the human and sex robot finding each other to be "made for each other," and finding their union to constitute a "good match" in the way that human romantic love can be."* While they are quick to add that "the robot would need to be fairly sophisticated in its functioning for the just-sketched type of reasoning to be applicable," their sex-robot-anticipation reinforces key aspects of the sociotechnical vanguard vision of sex robots as good companions, namely that

(a) The issue to focus on is whether sex robots will one day be able to meet the right criteria for being considered a good companion with whom genuine love relationships are possible—where in answering that question, the focus is on the kinds of capacities the robot qua quasi-human embodied agent would have to possess

(b) In pondering this issue, our conceptual analysis is fruitfully informed by jumping into future scenarios that are, to a great deal, informed by intuitions derived from pop culture imagery and stories.

While challenging Levy's technological deterministic prediction that our future with sex-robots is inevitable as a matter of fact, many of the philosophical critiques sketched above simultaneously accept that future, *not as something that is sure to happen, but as the future scenario we must anticipate at the philosophical level.* This in turn informs the kinds of ethical issues that emerge as the salient ones. When the potential socio-ethical harmfulness of sex robots is anticipated, the focus is often on how they may erode a range of virtues, skills, and capacities important for individual and societal human flourishing. Conversely, when the potential ethical benefits of sex robots are anticipated, the emphasis tends to be on the therapeutic, healing role that sex robots could play in the lives of particular lonely individuals, particularly lonely, disabled, or elderly persons (Cf. Van Grunsven & Van Wynsberghe; Di Nucci, forthcoming; Frank & Nyholm, 2017). What I want to argue now is that these ethical issues, while not insignificant per se, cannot be evaluated comprehensively without a robust look at the kinds of technologies that sex robot systems (will) depend on in order to serve these potentially beneficial purposes.

4   Sex-Robot-Anticipation and the Importance of Technological Groundedness

Deborah G. Johnson and Mario Verdicchio (2020) have criticized certain sex-robot-anticipations for leaping into future scenarios that skip over the details of the messy dynamic processes that would need to occur in order for that future scenario to become reality: "Since technology and society are inextricably intertwined, we cannot afford to neglect complex scenarios for the sake of an easy shortcut to a future where humans and robots 'are the same'. Such a future may be easy to conceive, but it is

extremely hard to realize" (421). The objection targets figures like Levy, who, with their commitment to technological determinism, downplay the complex role that societal phenomena play in the trajectory of emerging technologies; a deterministic "leap [into the future] is made possible by neglecting the social processes by which the new technology would have been conceived, designed, marketed, adopted, and assigned meaning all along the path to its depicted endstate. In this respect, many authors seem to be *technological determinists*, that is, they believe that the future of humanoid robots will be solely determined by technological developments" (419).

While I agree with the spirit of Johnson and Verdicchio's critique, I would add that the same criticism applies to some of the non-deterministic philosophical sex-robot-anticipations we have just looked at, where the factors overlooked in these anticipations often concern precisely the relevant *technological developments*. In fact, even Levy's own view, though anchored in a firm optimistic belief in what technological developments can make possible, lacks a robust engagement with the types of technologies that would need to be in place in order for his imagined future to become actual. While Levy has actively contributed to the AI-field, Artificial Intelligence is essentially an after-thought in his optimistic 310-page long sex-robot-anticipation. After a brief historical overview of the advances made in traditional computational AI, which has excelled at formalizing rule-governed actions in task-specific domains (such as chess), Levy simply wagers that "Given that playing chess well is a task that requires much brainpower, I believe that another thirty years from now, give or take a few years, we will see strides made in just about every other area of AI, including emotion, personality, and all the mental qualities required of a robot that can behave as you and I do" (2009, p. 270).[7]

Levy is not the only sex robot scholar guilty of leaving the technical specifics out of his sex-robot-anticipation. Consider, again, Frank and Nyholm's analysis. While they largely take up a cautious stance on what AI may make possible in the future with respect to enabling

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[7] Admittedly, Levy discusses AI and other technological developments underpinning sex robot development in detail in his earlier book *Robots Unlimited: Life in a Virtual Age* (2005). But it matters that these technical specifics are largely absent in the book that has been so influential in setting the tone for how we talk about sex robots.

human-robot love relations, they do gesture at the possibilities enabled by *machine learning* in implementing at least one of their criteria for mutual human-robot love; the ability to perceive and respond to one's beloved in their *unique particularity*. As they put it:

> The less difficult challenge, as we see things, is to build a sex robot that could be responsive to, or track, a person in his or her particularity, both in the synchronic and diachronic senses. … It is possible to build a robot that is so constructed that it learns from experience ("machine learning"). This could be used to enable the robot to participate in a form of interaction with its "beloved" that over time acquires more depth in some sense … Certainly, this is something Levy speculates about when he predicts the future of human-robot relationships. Of course, *the trick here* is to conceptualize some way in which the relationship between a human and a sex robot could be "deepened" in a sense that doesn't just mean that the human gets more and more attached to the sex robot over time. It should also *somehow* involve a mutuality whereby the robot reciprocates as well". (231, my italics)

Note how the *somehow* is tagged on as an afterthought: "somehow" machine learning will have to develop in such a way that genuine mutual reciprocity (i.e. mutuality that goes deeper than behavioral responsiveness through tracking) is realized.[8] But even at the behavioral level, formalizing responsiveness in human interaction faces grave challenges. Many of our day-to-day social activities and interpersonal exchanges depend for their success on people's ongoing ability to identify and be responsive to the rich scala of expressions human beings are capable of (Cf. Van Grunsven & Van Wynsberghe, 2019). Take, for instance, the ability to perceive that someone is smiling at you. In order to respond to this appropriately (which in turn shapes the kind of interaction set in

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[8] Of course, people recognize that sex robots will be systems that depend on a variety of technologies and technological systems for their functioning. Danaher notes, for instance that Realbotix's "RealDoll's AI will be cloud-based and will learn and adapt to its user's preferences. This suggests a … significant and serious engagement with the latest AI technologies" (Danaher, 2017). But these technologies are typically merely touched on. My point here, has been that by dwelling on them in a more sustained way, our perception of sex robots—the sorts of things they are and the ethical implications of developing them and embedding them into the lives of often particularly vulnerable people—will likely change.

motion), you need to recognize not just *that* the other is smiling and that she is smiling at *you* (robots are already capable of that); you also need to be able to distinguish between the strikingly different meanings that smiles can convey (think of the social importance of being able to perceive the difference between a seductive, a friendly, or a snarky smile). Furthermore, the different meanings that smiles can take on (and what counts as an appropriate response to them) are contextually shaped and depend on shared forms of institutional and socio-cultural know-how (Cf. Van Grunsven & Van Wynsberghe, 2019; Van Grunsven, 2020).

Given the mind-boggling range of contextually shifting meanings that human linguistic and embodied expressions can take on, sex robot systems tasked with identifying appropriate responses to human users on the basis of machine learning abilities would likely confront a series of *ill-posed problems*. An "ill posed problem," as John D. Kelleher (2019) explains, emerges in the context of machine learning when "the information given in the problem is not sufficient to find a single best solution; instead, multiple possible solutions will match the data" (16). What results is a "function-selection problem" (16). To help solve this 'function-selection problem', a machine learning system is equipped with a so-called inductive bias, which provides "an algorithm with a perspective on a data-set," which helps settle which function to "extract … on the basis of limited data" (Kelleher, 18). The crux is to implement an inductive bias into the system that is neither too simplistic nor too complex and permissive. When a bias is too simplistic, the function that the machine learning system uses to sort and respond to its environment "underfits the data," meaning that much data that is in fact relevant to the situation is ignored by the system (Kelleher, 20). This problem will constantly loom for a machine learning system tasked with identifying the right function(s) for optimally sorting and responding to the data relevant for navigating human interaction in all of its complexity. By contrast, when we opt for a bias that is too permissive, the system will become too complex, treating as relevant data that human beings typically know to ignore in their day-to-day practical lives (while I am typing this I am ignoring the dust that has accumulated in the corners of my living room, though it is strictly speaking there as potential data for me to attend to). A robot system that would include too much irrelevant data in order to predict how to best

respond to its human user would frequently fail to *frame* (Dennett, 1984) what's relevant in the situation at hand (I wouldn't want my 'good companion' to attend to the dusty corners in my apartment when I need him to be responsive to my particularity, reacting appropriately to my current emotional or physical needs).

Of course, this warning about the limits of machine learning in formalizing "general human level artificial intelligence" (McClelland, 2017, p. 247) will not prevent people from trying to actualize the sociotechnical vanguard vision of sex robots as genuine good companions. What I want to raise as a concern now, is that in doing so, in attempting to materialize the vision of sex robots as good companions, a range of technological resources, such as blue tooth technology, deep learning, and the Internet of Things (IoT) will likely be explored and implemented. It is the ethical issues tethered to these technologies, mobilized in settings of profound intimacy and vulnerability, that I believe we should focus our primary ethical and philosophical efforts on, or so I will now argue.

5   From Quasi-Human Agents to Distributed Systems

We have seen that *Realbotix* encourages us to think of *Harmony* as the embodied version of the Android OS in the film *Her*. But in fact, *Harmony* is a system set to combine three different interfaces through which users access their customized companion: an application accessible via phone, a VR Headset, and "a physical interactive android body" (Coursey et al., 2019, p. 91). These interconnected platforms, in turn, incorporate additional technologies. For instance, we learn that *Realbotix* has been focused on developing "a series of small embedded processors for tactile and orientation sensing … The first application area is a Bluetooth module for genital activity sensing" (Coursey et al., 2019, p. 91). Let's pause here for a moment. What does it mean for Bluetooth technology to find its way into one of the most intimate and self-exposing kinds of activities a person can engage in? Bluetooth can, after all "disclose a great deal of data from your mobile phone, laptop, or computer,"

that can be hacked, while also functioning as a "very accurate tracking signal" that enables app makers to "trace your home and work addresses, your doctor, your favorite places to shop, and much more about your life."[9] Privacy concerns about the use of Bluetooth technology in the sex toys-space, specifically teledildonics, have already been highlighted at the 2016 Def Con hacker conference in Las Vegas, where an "app controlling … [a] vibrator allowed anyone within Bluetooth range to seize control of the device" (Sharkey et al., 2017). Furthermore, a successful 2016 class action lawsuit revealed that teledildonics company Standard Innovation Corp "collected and transmitted" data that "included the date and time of each use of the vibrator and the settings used" (Sharkey et al., 2017).

Bluetooth also plays a central role in the workings of the IoT, which refers to the interconnectedness of "objects of everyday use" via the internet (Lugano et al., 2019, p. 116). In pursuing the vanguard vision of sex robots as good companions, the possibility of embedding the robot in the wider digital network of smart objects that a user surrounds himself with is an attractive one already employed by one of *Realbotix's* subcompanies, *NextOS* (Coursey et al., 2019, p. 79). As I argued in the previous section, the practical lives that human beings live and the interactions they engage in are multifarious and contextually shaped. A system that is hooked up with (and can benefit from the data gathered by) other practical use-objects of its user will have a richer set of resources to draw on in predicting what behavioral output is likely desired by the system's user. But what does it mean in terms of our security and privacy when we expose ourselves to a system like this? Here too, one of the key worries concerns the opportunities for hacking afforded by a robot that is so thoroughly embedded within a larger smart system. When our laptops are hacked, we are vulnerable in a very different way than when a self-moving human-size embodied entity "equipped with the ability to sense, process, and record the world around them," is hacked (Calo, 2011, p. 187).

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[9] https://vpnoverview.com/privacy/devices/bluetooth/#:~:text=In%20most%20cases%2C%20Bluetooth%20is,have%20access%20to%20your%20information.&text=Bluetooth%20could%20disclose%20a%20great,phone%2C%20laptop%2C%20or%20computer

There is another way in which sex robots, if proliferated, have the potential to be profoundly invasive. This comes into view when we home in more on the employment of deep learning AI in the development of sex robot systems. *Realbotix* is "actively exploring the use of deep-learning based text generation techniques for both content generation and direct interaction" (2019, p. 92). As I discussed in the previous section, the inductive biases that give an AI a perspective on a data-set such that it can determine what counts as the right output in a particular situation are likely to be either too simplistic or too permissive when it comes to approximating general human intelligence. In the case of deep learning algorithms, which tend to have weak permissive inductive biases, the AI copes with an ill-defined problem by having access to very large data sets (Kelleher, 2019, p. 21). When there is lots of data to sort through, the number of functions that emerge as the right candidates for a solution that matches the data decreases. As Kelleher (2019) argues, these large data sets, which have "become available through online social platforms and the proliferation of sensors" (21) can be and have been used "to target us with unwanted advertising and to control our behavior both overtly and covertly" (Kelleher & Tierney, 2018, p. 184). The worry that sex robot users will be exploited for their data is, I believe, one of the key ethical worries to focus on in sex-robot-anticipation. After all, as we have seen, sex robots are by design supposed to evoke the intentional stance in users, encouraging users to treat a system that is in fact extended across a range of platforms and technologies as a singular-minded embodied agent; an agent who "cares" and is "infinitely patient," as the Realbotix-Levy's vision promises. This agent is designed to encourage users to expose themselves, share their vulnerabilities, and the specifics of their lives (recall Levy, words that sex robots will "be programmed to disclose virtual personal and intimate facts about their virtual selves *and to elicit similar self-disclosure from humans*" (143, my italics). Indeed, according to the *Realbotix*-Levy sociotechnical vanguard vision of sex robots, this is precisely their robot's raison d'etre, enabling the alleged societal benefit of these systems; it is precisely by encouraging users to open up that they can allegedly provide much needed support to the lonely, the elderly, the disabled.

Frank and Nyholm tentatively ponder that "if indeed there are significant numbers of humans who are unloved by other humans, then in that case the development of love robots seems like a worthy investment" (2017, p. 238). Many others have been taken in by some version of this argument or have given it serious attention, myself included (Van Grunsven & Van Wynsberghe, 2019).[10] While we cannot deny some of the therapeutic and comforting effects of having a digital companion like *Harmony*, as evidenced by the stakeholder interviews we saw earlier, it seems to me that a meaningful assessment of the argument that sex robots serve the lonely and, potentially 'the elderly' and 'the disabled' (as though these are homogenous cohorts) must consider what it means for these people (who are often vulnerable in a heightened sense) to expose themselves and share the most intimate details of their lives with a system that thrives on the consumption and sharing of personal data. As M. Ryan Calo warns: "It says little about an individual how often he runs his dishwasher or whether he sets it to autodry. It says a lot about him what kind of "companionship program" her runs on his personal robot. … A description of how a person programs and interacts with a robot might read like a session with a psychologist—except recorded, and without the attendant logistic or legal protections" (2011, p. 188). Within the European Union, the GDPR (General Data Protection Regulation) mitigates some of these concerns. That said, one of the GDPR's key legal mechanisms, namely *informed consent*, leaves plenty of room for the large-scale collection of data for marketing purposes (Cf. Wachter, 2018).[11] Large portions of consumers are ready to give up a wide range of

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[10] For instance, the Foundation for Responsible Robotics [FRR], maintains that Matt McMullin, CEO of *Realbotix*, "made a persuasive argument [to them] for the therapeutic use of robots and dolls for a certain sector of the population" (22). When asked by the FRR whether "we will see the prices become more affordable for sex robots?" McMullen's answer is brief: "Time will tell on this, but we are hoping that the hardware and software we are developing will be affordable" (33). The FRR's interview with McMullen moves onto the next question, inviting McMullen to elaborate on the technological functionalities *Realbotix* is focused on: "The AI is the key to all that we are working on" (32). This, to me, seems like a missed opportunity to dig deeper. A company committed to deep learning AI as "the key" is a company equally committed to the availability of big data that is needed to make Harmony appear as a good companion to its users.

[11] Similar concerns can be raised about the legal mechanisms of *privacy by design*, and *transparency*. For instance, as stated on https://gdpr-info.eu/issues/privacy-by-design/, "there is still uncertainty about what "Privacy by Design" means, and how one can implement it. … Legislation leaves com-

personal data in exchange for a product or service they perceive as valuable to them.[12] As the personal testimonies of the individuals seeking out romantic bots overwhelmingly indicates, the perceived value of having an artificial romantic partner is likely to outweigh the perceived downside to sharing one's personal data. I wager that this trade-off is perceived precisely in this way because of the way in which sex robots are framed: as good companions. A different way of framing them might change what users are willing to give consent to.

As the distributed systems that they are, sex robots are particularly equipped to gather massive amounts of third-party marketing data that would be of interest to a wide range of companies and industries.[13] At the surface level, exploiting our 'Darwinian Buttons,' sex robots may appear to us as singular quasi-human embodied companions. But unlike genuinely good companions, sex robots, if proliferated, will neither share our interests nor have our interests at heart. Instead, they could very well serve as an ideal platform for direct marketing. Imagine your robot, that system that you've come to relate to as your good companion,

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pletely open which exact protective measures are to be taken." With regard to the requirement for transparency, article 12(7) of the GDPR states that "The information to be provided to data subjects pursuant to Articles 13 and 14 may be provided in combination with standardised icons in order to give in an easily visible, intelligible and clearly legible manner a meaningful overview of the intended processing." However, as Wachter (2018) has argued, when icons are deemed sufficient to provide users with a robust sense of what they are consenting to, "the intended level of sophistication for the information provided appears to be low. It is thus questionable whether the notification duties will provide data subject with meaningful understanding of the risks of machine learning" (448). She concludes that "GDPR standards urgently require further specification and implementation into the design and deployment of IoT technologies" (448).

[12] A 2020 survey conducted in Australia, Germany, Japan, New Zealand, the United Kingdom (U.K.) and the United States (U.S.) found that while in abstraction people increasingly express concerns about the privacy of their personal data, in practice, their behavior suggests otherwise. See https://www.prnewswire.com/news-releases/survey-shows-consumers-very-willing-to-trade-personal-data-for-financial-benefits-301106196.html

[13] A 2018 report from *Deloitte* on predictive modeling for insurance underwriting emphasizes that "data, is not subject to the Fair Credit Reporting Act (FCRA) requirements, and does not require signature authority by the insurance applicant to use it in a model." The report is quick to brush any ethical concerns about this aside by equating societal acceptance with ethical acceptability: "We believe society has accepted this openness, not without hesitation, because on average it provides more of what we want, less of what we do not. In addition to consumer marketing applications, predictive modeling using third- party consumer data has also been accepted for property and casualty insurance underwriting." https://www.soa.org/globalassets/assets/library/newsletters/product-development-news/2018/june/pro-2018-iss110-stehno-guszcza.pdf

recommending *Zoloft* or a *Gold's Gym* membership after you confided in the system to feeling down. While there are various risks that could be at issue if sex robots were to become proliferated into society, the one that emerges as a central one from my analysis is thus the risk of deception resulting in manipulation; it is precisely the semblance of sex robots as living good companions (situated in the most intimate spheres of a person's life) and the reality of sex robots as distributed data-mongering systems representing third-party interests, that makes them paradigmatic deceivers capable of getting users to behave in ways that may directly undermine what is ultimately in their best interest.[14] Though this concern has been raised by others (Cf. Calo, 2011; Scheutz, 2011), it is underrepresented in the majority of sex-robot-anticipations on offer. Moreover, by leaving this concern largely unaddressed *and focusing instead* on whether or not sex robots can ever be conceptualized as good companions in a robust sense of the word, many of the ethical issues the literature has highlighted are, I worry, somewhat of a red herring.

Some might argue all ethical issues highlighted in sex-robot-anticipations are pseudo-problems. According to McClelland when we look at where the technology currently is, we can anticipate that sex robots will most likely never become widely proliferated into society. The financial costs associated with getting a robot to approximate even just some of the bodily dimensions characteristic of human action and interaction will make sex robots a niche technology for the rich:

> If we look among currently available robots, the most agile and mobile of them all seems to be Honda's Asimo, which also has a battery life of about 90 minutes per charge. And you can buy Asimo today. But it will cost you $2.5 million; you can lease an Asimo for $1.8 million per year … virtually no one outside of the very richest layer of human cultures is going to buy real sexbots. (2017, pp. 251–252)

A similar viewpoint is endorsed by Rose Eveleth:

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[14] I want to thank an anonymous reviewer for encouraging me to explicate the exact type of harm I am concerned with.

AI has advanced in leaps and bounds recently, but it still can't simulate much of the emotional labour which goes into sex and relationships. Computers might be able to beat a human at chess, but sex is more like a dance; each partner has to predict and respond quickly to movement.… Building and designing robots for sex is going to be harder than most people realise, making them convincing without being creepy will be a huge hurdle, and overcoming the barriers the sex industry faces for funding will be enormous. The idea that a company might come along any day now and make an affordable and convincing sex robot ignores the reality of both research and regulation. (2016)

As technologically grounded, I think that these sex-robot-anticipations ought to be taken seriously. That said, what I have tried to show here is that another scenario is worth anticipating as well. As I posed in the introduction, sex-robot-anticipations should not only be technologically grounded but also *reflective*, where I suggested that *sex-robot-anticipations should reflect an awareness of how acts of anticipation can actively frame how we, as a society, see, think and talk about an emerging technology in terms of its societal acceptability*. Sex-robot-anticipations that do not take this into consideration but unreflectively reinforce the framing of sex robots around the question of their potential status as a good companion may inadvertently pave the way for the pursuit of a vision that they are in fact typically critical of. They are giving scholarly credibility to the idea, already deeply entrenched in popular culture, that sex robots are to be theorized and assessed as quasi-human autonomous embodied agents. While Eveleth maintains that "overcoming the barriers the sex industry faces for funding will be enormous," the sex industry is at the same time a multi-billion-dollar industry. And if sex robot developers present the right sociotechnical vanguard vision, one sufficiently linked to already entrenched sociotechnical imaginaries surrounding our future with robots and the societal benefits such a future might carry, then it is not implausible that investors' attitudes toward sex robots would change. In fact, as I have suggested, it seems to me that there is an obvious but ethically disturbing business model that would make sex robots governed by deep learning AI functionalities and embedded in the IoT a highly attractive technology for investors.

6   Conclusion

The idea that we will soon live in a world in which humanoid robots are indistinguishable from human beings seems to me pure phantasy, even at the merely behavioral level. However, we need to consider that the sociotechnical vanguard vision of humanoid sex robots as good companions can be coopted to pursue this flight of fancy. If a sociotechnical vanguard vision is sufficiently tethered to entrenched accepted sociotechnical imaginaries, an emerging technology can move from a fringe artefact to an endorsed innovation with perceived societal benefits. This, then, can mobilize otherwise cautious investors and convince mainstream companies to venture into this space. Sex robots are uniquely (indeed explicitly) designed to manipulate their users. Hence, while users are tempted into adopting the intentional stance toward their newfound companions, seeing them and interacting with them as singular embodied agents who become increasingly responsive to their specific needs and desires, the underlying technologies supporting this semblance of human agency reveal that, at a deeper level, sex robots are better understood as distributed systems. These systems involve a range of technologies that are susceptible to privacy and security violations and that are set up to be exploited for commercial advertisement purposes. While some have raised ethical worries similar to the ones I have raised here, these worries are not at the forefront in current sex-robot-anticipations. More importantly, the under-representation of these themes in current sex-robot-anticipations and the tendency to frame sex-robots as (quasi)autonomous embodied beings who may or may not serve as good companions has not itself been thematized and critically reflected upon. And this, I argued, should worry anyone who believes that our sex-robot-anticipations shouldn't play into the realization of a vision that, although likely pure sci-fi, can do grave ethical damage whilst being pursued.

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