Sex with Robots for Love Free Encounters

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Abstract. This paper considers sex with robots for love free encounters within the context of pornographic experiences. Leisure sex and pornography are briefly outlined, along with the potential of the market. Limited research on both the user experience of pornography and the physical functionality of sex robots is highlighted. The physical embodiment of sex robots is considered, questioning whether we need human-like robots or something else entirely. Technological advances for pornography and their relevance for sex robots are explored examining the potential offered through the integration of Virtual Reality, teledildonics, soft and wearable robots. The potential of categorising sex robots as fantasy hardware is considered seeking to provide a palatable terminology. This paper concludes that researchers need to engage with the Porn Sector in creating innovative sexual experiences with robots, aiming to create a new type of sexual experience, rather than replicating humans as seen in most science fiction.

Keywords: Sex robots; pornography; teledildonics; soft robots; Human Robot Interaction, user experience.

1 Introduction

Socially we are often encouraged to entwine sex and love, yet there are multiple views, perspectives and experiences of sex, a limited number of which incorporate or relate to love and vice versa. This paper discusses the potential of robots for sexual activity that whilst it can be used to enhance a loving relationship most frequently is not. Instead, pornography is representative of a sexual activity that is quintessentially not related to love.

There are supporters for the perspective that one day we will create robots that we can love and even marry. Yet, it must be queried how sensible, natural or wise it is to love a created object, even one that has the 'look and feel' of a living being. Whilst a robot may simulate life, fundamentally it is not living. It cares not one jot about anything but adequately completing the code stored in its technology. Yes, it may be possible to create robots that are simulacrums of reality, however, this is all they are and thus the idea of evoking emotions such as love through human- robot interaction seems oddly inappropriate.

Of course there is the argument that some people need to feel loved and that a robot could provide an ideal solution for someone who isn't being loved. I'm not

convinced, for whilst another living being may require love, a created object, even one that appears to love in return does not really require or reciprocate this love. Requiring a suspension of disbelief to enable durable love seems unrealistic and ultimately you know your lover was created by a bunch of computer scientists and engineers. Irrespective of such doubts, the popular vision that we will co-exist with lifelike humanoid robots for companionship, love and sex continues to dominate. This vision is strongly influenced by science fiction, with a whole host of lifelike robots, played by people, to choose from. To make the fictional narrative interesting and effective, the robots whether sex workers or loving partner, exhibit emotional and social traits of 'real humans.'

In responding to this fictional vision of the social, emotional humanoid robot, the Human Robot Interaction research community has largely focused on steps towards creating loving, caring robots that are able to socially interact, with significant literature on affect and emotions in social robotics. The focus has been on the robot 'mind' and particularly the affective component, often with long term relationships as the context. However, do robots really need to be affective to provide a sexual experience for the user? With humans, even the most casual single liaison inevitably involves some social interaction, so intuitively the answer would be yes, sex robots should have some social capability. However, whilst affect has a role, surely more importantly the sex robot should be able to autonomously exhibit and physically respond to / for sexual pleasure.

The technical challenges surrounding physical embodiment for sex robots are immense, yet there has been relatively little focus on creating physical embodiments of sex robots. Physically embodied robots such as Nao, Pepper and Baxter have no sexual capacity. Although Pepper's purchasers were required to confirm that they would not use Pepper sexually, it is challenging to imagine how Pepper could be used as it is just a plastic doll with no sexual characteristics or orifices with only simple manipulation potential.

If we consider creating a robot for an excellent sexual experience for the user, then the user requirements are significantly reduced if our focus is on physical, sexual arousal and pleasure within a context that does not require love. Removing, love, social and emotional relationships from the requirements for the sex robot is commonly depicted in futuristic settings by sex robots operating as sex workers. However, perhaps the future for sex with robots might be something completely different from that portrayed in the media. Instead, could sex robots, like other hardware - such as consoles, form a part of our leisure activities. This paper explores the potential for sex robots to enhance a typical individual leisure experience, that of the user experience of pornography.

2 Leisure Sex and Pornography

A 'vanilla' view of sex still continues to dominate popular culture, particularly in the media, with healthy, appropriate sex often seen as an activity between consenting, loving, often heterosexual adults typically in a long-term relationship. Complementary

to this, Attwood and Smith's discussion of leisure sex highlights a myriad of sexual practices and perspectives within "*a modern, mediatized sexual culture whose symbolic resources valorize revelation and hedonism rather than discretion and self-discipline*" [1].

Leisure sex is on the increase and gaining acceptance, for example, we are no longer shocked by the casual hook-ups of celebrities, merely titillated and amused. Casual hook- ups, affairs and sex as fun are becoming a more socially acceptable activity. This trend has clearly been facilitated by technology, with significant growth in hook-up and 'cheating' sites; social networks to share and gain experiences; increasing availability of adult content, such as on-line strip shows, sex web-cams, along with a significant amount industry and user generated pornographic content; and growing use of adult interactive virtual reality platforms across a range of consoles and devices.

Whilst much on-line leisure sex has focused on facilitating sexual activity between people, there is a growth in providing on-line sexual experiences that do not require another person. There are obvious benefits to this if the sex provides the required arousal and experience whilst avoiding potential dangers of intimate engagement, such as disease or unpleasant encounters, and of course some of the social consequences of getting 'caught.' On-line sexual experiences that do not involve another person are often pornographic, with content ranging from non-interactive video, audio and photos of real people to interactions with digital sex partners with no human in the loop.

There are many who argue that sex and pornography are, and should be, different things [2]. However, this would naively assume that the distinction between pornography and sex relates to the mechanics of how one physically engages in sexual activity. Instead the distinction is actually made to facilitate a vision of pornography as something morally deviant, harmful and unnatural as compared to a married couple having loving sex [3].

Pornography is part of many people's sexual arousal and activities, sitting on the spectrum of everyday, typical sexual experiences One of the most widely cited set of porn statistics [4] identified that every second 28,258 internet users are viewing porn; 25% of all search engine requests are pornography related; and 35% of all internet downloads are pornographic. These statistics are not without problems or critique [5], [6], but they have achieved status from their frequent repetition and resonate with the common sense belief that porn is an ever-increasing and regular on-line activity for many people.

Whilst there is some use of pornography by couples, predominantly we watch porn alone. And the emphasis is on watching rather than interaction. With this focus on the individual and non-interactive user experience, where pornography does differ from sex is in its inability to provide a sense of sexual intimacy, something that is inevitably generated through a sexual encounter between participants, however brief.

With the advent of sex robots, pornography could be extended through robotics into a sexual act performed on an individual by another entity. Thus intimacy of sorts, albeit not with another person, begins to be possible in an individual context. This sexual intimacy may be very different to that which we experience with people. However, how we use pornography is also different to how we experience sex with others.

3 Any Guidelines for the Sex Robot for Pornography?

The significant size of the porn industry and widespread reporting of frequent use, would suggest that on-line porn use would be a well-studied domain, with plentiful design, development, interaction and evaluation advice for the user experience that could be used to ground Porn Robots. Unfortunately, this is not the case, with [7] noting that "the intense proliferation of and access to pornography occasioned by the Internet is one of its most important and least studied effects." There is a recognised need to consider sexuality and human computer (sexual) interaction [8], and [9] argues that "HCI has a unique contribution to make to the broader study of pornography." This hasn't happened, and as noted in [8]'s comprehensive review of HCI and sexuality: "Works on sexual technology such as pornography, sex toys and health equipment are very few in number."

Work on sex robots is largely speculative and about attitudes to what might be and what we might need to think about. Much of this focuses on personal, social and cultural impact which largely relies on sex robots becoming pseudo-people, just as in science-fiction (e.g. Humans, Westworld). Thus, although there are studies relating to how relationships may be with sex robots, what the ethics might be, how we might live with them, love them, decide to buy them, etc. what is lacking is the sex robot itself.

Academic speculation has sparked media interest, culminating in articles implying that sex robots will be purchasable in the very near future. More, that these sex robots will provide intimacy, and be able to converse and interact like another being. This has resulted in user expectations of sex robots being impossibly high.

Currently, there are no sex robots, with the frequently referenced Roxxxy yet to be seen and reviewed by the scientific community and viewed by Levy as a hoax. And whilst there is a nod to technical challenge in the academic literature on robot sex, the focus has been on thought and potential, the 'what if' scenarios, rather than actually making the robots and evaluating what can be achieved.

Whilst the research community remains nervously on the sidelines and fails to engage with the design, development and evaluation of technology for pornography, the Porn Industry has no such qualms. As with earlier technologies including photography, cinema, user-generated content [10], software affiliation and Tube sites [11], the Porn Industry is clearly willing to invest and use any technology they can to progress their sector. And robots are within their sights.

4 Requirements for the Sex Robot - Technological Responses to Pornographic Challenges

Whilst pornography is often considered and advertised as 'leaving nothing to the imagination' and 'providing an immersive experience,' currently these claims are only partially met. With pornography restricted to visual and auditory stimuli, there is clearly a need for the imagination to fill the gaps left by the other senses to increase the sense of immersion. And until recently, on-line porn was screen based in a non-immersive media format that is clearly physically separate from the user. Times are changing, with

VR technologies, particularly the emergence of VR headsets such as Oculus Rift, Samsung Gear and Google Cardboard offering pornography a way to provide full audio and visual immersion.

The inconvenience of wearing a VR headset is massively outweighed by the benefits of the increased appeal of VR Porn, with sales in VR headsets revealing clear consumer interest. Notably, Oculus has placed almost no restrictions on content to be developed for the Oculus Rift. This effectively opens the way for pornographers, such as SugarDVD 'the Netflix of Porn,' who are developing VR content [12] along with a dedicated VR Porn channel. Predictions of trends by companies such as Market Watch are that the Adult Content area of VR will have similar sales potential as the game sector.

With VR, it is technologically possible to convince ourselves that we are in an audio-visual reality, thus hearing and sight, the two key foci of porn videos can already become a realistic experience. This move to VR for pornography highlights an important alternative when considering sex with robots, with the opportunity to provide the robot's audio and visual aesthetic through a headset rather than within the physical embodiment of the robot itself.

Our goal with sex robots for pornography is to facilitate the user in individual sexual activity within the context of the pornographic narrative. With appearance, sound and to some degree sense of presence in the narrative dealt with by VR, then our focus turns to embodiment. Whilst VR removes an immense number of technical challenges for sex robot developers, in some ways it is removing the easiest challenge of all which is the simplest physical representation of the sex partner, that is another human.

If a sex robot needs to have a humanlike embodiment, then there are already potential options under development. Abyss Creations have had considerable success with RealDoll, a high-end product at $12k or more. RealDolls are realistic lifelike products, except that the dolls are static, inanimate objects, devoid of life. RealDoll dolls are posable - but still and quiet. Incorporating robotics into such dolls is possible. Where humanoid robots are created, such as by Ishiguro's lab, the results may provide lifelike behaviour, but the insides are full of hard electronics without sexual functionality.

RealDoll have been investing heavily in AI and doll robotics [13]. Like many contemplating love and sex with robots their focus is not just on the physical, but also on improving the dolls ability to socially interact including verbally and to exhibit and respond to affect. There are rumours that Abyss Creations will release a RealDoll that is a sex robot in 2017, however, with the mechanical challenges significant, the goal of achieving a sensual, quasi-realistic sexual experience with lifelike humans resolving hardware issues from noise to texture to heat still seems unlikely in the near future.

With dolls not affordable and VR able to mitigate the challenge of auditory and visual embodiment, then should this change what the physical embodiment of the sex robot could be? Do we need a whole body or even a body at all? If our requirements are for the robot to facilitate sexual activity, should we focus on sexual stimuli and thus the sexual embodiment of the robot, focusing on SexTech's potential to morph into the basis of a sex robot.

Sex toys and particularly teledildonics offer considerable potential for the sex robot. Although they have been primarily aimed at long distance lovers, with a human representing their embodiment through the teledildonic such devices are equally relevant for interactive virtual sex with a character. There has been some use of them in sex games, such as those by SOM with linked teledildonics using sensors to provide relevant feedback to the application. TENGA have gone further providing linked VR via headset and teledildonics offering an interactive, immersive experience. And with a much stronger pornographic feel is Pornhub's Twerking Butt, which includes a VR headset and sex toy with a range of options and narratives.

5 Reconsidering the Appearance of the Sex Robot

A key element of sexual pleasure for many relates to the visual experience. We currently naturally see sexual activity in terms of one another and our physical makeup and design. However, just as the perfect robotic paint sprayer looks little like us in its most effective implementation, why would we expect the robotic sexual partner to look like us? Do we really need aesthetically pleasing robots that look like attractive sex partners? And even if we don't, would we want to have sex with something that looked operational and factory spec? Very few teledildonics are attractive, they typically look like crude, sex toys with a clear functional goal. However, this is no longer an issue, no need to keep our eyes tight closed and work hard on the imagination and fantasy… instead we just gaze into the Oculus Rift with an engaging pornographic narrative providing a new user experience of sex.

If we look at robots used in domestic situations, we can see that our views of robot appearance tailored by sci-fi TV, books and films are delightfully absurd. The robot that actually hoovers the house has little visual resemblance to a maid, yet they do the job well. And so, if a well-designed robot could do the sexual job well, why are we waiting for Jude Law as the AI Gigolo? And if it is him we are waiting for, can't that just be via a VR feed? By removing the need for the robot to look lifelike by providing it via alternative technology such as via a VR headset we completely free up the requirements for the physical embodiment of the robot.

Whilst there is much interest in interactive virtual sex, such experiences typically require the participants to be real rather than robots. Where characters replace avatars the approach tends to be relatively simplistic, with user input often limited to story world selection, partner (character) appearance with a limited number of alternate endings. To achieve good robot pornography requires increased sensory input for the user and autonomous sexual reciprocity from the robot rather than simplistic teledildonics tied to a script providing more or less the same experience to all users.

There have been significant advances in physical computing, with increasingly sensitive sensors and actuators. With the current trend in the sex toy market to gather user data, the understanding and application of effective sexual mechanics will increase. Whilst there is concern about this data use, most users are content for their data to be used to improve the next model.

For the sex robot, data will be key, initially in establishing parameters, actions and behaviours with their various physical embodiments. Then, as interaction history develops, the robot will need to respond in line with the user's requirements and expectations. In some ways, this will be similar to training a speech recogniser. With this adaptation, the sex robot will provide a personalized sexual experience of the pornographic narrative based on the user's preferences.

And this will be key for the sex robot used in pornography, with many porn users watching a wide variety of pornography across a range of genres. This variety is a significant issue for the sex robot, as most users will want to be able to engage in multiple experiences using the same technological set-up. Just as with games consoles users will want to interact with a range of narratives and a variety of characters through the single robot. Thus, if the requirement changes from the perfect single sex partner to something that can be many sex partners, then the issue is can the robot morph physically representing multiple lovers rather than does the robot look like a particular individual.

Fundamentally a robot is a physically embodied entity with some degree of autonomy in behaviour and interaction. Further, and of particular importance for sexual activity, that this embodiment must enable physical, sexual activity and this physicality must include more than visual and auditory stimuli. Whilst for sex robots this can result in quasi-human designs, for example in the form of sensor filled dolls that could synch with and act out virtual character's moves whilst providing haptic feedback, there are alternatives. As we move away from the sex robot companion ideal towards the requirements for an interactive experience of pornography provided by an ensemble of sexually arousing narrative, VR, SexTech and robots, we must resist our functional fixedness to the human body as the provider of sexual experience.

Recent developments in soft robotics [14] could mean that rather than our traditional AI gigolo what we actually need is a wearable robot moulded intimately to ourselves. For engaging in sexual activity wearable robots offer an interesting avenue, with soft robotics having potential to enhance haptics and teledildonics. Thus, why not design a sex robot as a wearable, soft robot, able to morph and change as required, in line with the user's needs and requirements and the pornographic narrative. Coupled with an immersive VR experience solving the visual and auditory challenges, particularly removing the issue of the aesthetic of the robot this integration offers considerable potential for providing a novel porn experience, one that could include significant interactivity.

Whilst soft and wearable robots are still at a relatively early stage and developed primarily within the health and defence sectors, they do offer real potential as a device for pornographic interactivity. Wearing a soft robot, packed full of biosensors and technology could enable the robot to provide intimate pleasure tailored both to the narrative in the watched pornography and to the responses of the user. This symbiosis of soft robot and human would allow the robot to focus its autonomous intentions and behaviours to meeting the user's non-visual and non-audio sexual pleasure requirements and expectations, offering touch and feel sensations.

This is challenging for a robot as it will need to support a wide range of pornographic experiences rather than just one. This may be possible with wearable soft robots, however, intuitively it can be suggested additional haptic interfaces will be needed to enable users to experience shape and texture.

6 Sweetening the Concept

By integrating sex with robots and pornography, creating robot porn, we need to consider the terminology and its potential impact. With the negative connotations and strong anti-porn lobby are we doing robots a disservice by tagging them with porn?

Instead, could we suggest we are actually creating robots to support masturbation and personal sexual gratification? Although masturbation has received its share of bad press, there is general acceptance that it is not intrinsically harmful, whilst porn is still often viewed as deviant. However, it is still something that is distasteful for many, with limited social discussion.

Or instead, could we say that as an important element of pornography is fantasy [15], that we are providing fantasy sex robots. This is so much more pleasant as a term than porn robots and clearly distinguishes these robots, which are intended for love free encounters, from robots developed for other types of sex. This sanitization to sexual experience enhanced through technology rather than some strange kink such as robot-porn may even enable us more easily to talk about our experiences… "I did that new fantasy XXX the other night."

Undoubtedly robot porn will gain its own terminology, with the press already highlighting the likely dangers of this approach. The Porn Industry don't give a damn, their eyes are on the money and this is clearly a massively lucrative area. And more, this investment from the porn sector will impact significantly on almost any other interactive experience. The technologies developed to improve the porn experience will have valuable applications in sectors such as games and interactive movies.

7 Discussion

SugarDVD claim that they are "pioneering the future of what sex looks like." So, what should we do? Should we engage or should we hold back and let the porn sector decide what users will want. The merger of pornography and human-robot interaction should provide a tailored experience through multiple possible narrative contexts meeting the user's sexual expectations in terms of pace, skills and experiences. This combination of robotics, pornography, soft robots, teledildonics, sensors and other technologies would provide a new form of sexual experience. Engaging with pornographic media would be extended from an audio-visual watching experience to an immersive engagement with completely realistic audio visual quality, tactile and sensory stimulation, responsive interactivity and a very enjoyable new form of leisure sex.

This new outlet for leisure sex has no relevance to love and human relationships but instead provides the user with a novel sexual experience. There will always be those who raise issues such as technology addiction, but would this fantasy sex robot be addictive? If the robot was social and emotional then yes this could be really addictive, but if it just offered you good sex? Perhaps to some, but these will be few, although there has always been plentiful moral outrage about the impacts of porn [16]. Would this wearable soft robot give you unrealistic expectations of what to expect in sexual encounters. Possibly, but for most of us, no.

With pornography having primarily negative connotations, unsurprisingly robotics has largely remained shy of this area with a lack of research focus on creating robots that could enhance the pornographic experience. Although pornography is often viewed through a negative lens in robotics we should avoid such a response and instead perceive of pornography neutrally and as a way of obtaining investment to develop technology that will significantly change the user experience both for pornography and interactions in many other domains.

8 Conclusion

The use of robots for pornography is inevitable and underway, thus it would be eminently sensible for robotics to engage with an established, durable and growing sector with finance available for creating porn robots. Whilst there will still be a market for high end life like sex robots, this paper proposes an alternative, moving away from the robot's appearance to the sexual experience. By integrating soft and wearable robots, VR headsets, haptics and teledildonics in a pornographic narrative, a new experience can be provided targeting sexual pleasure requirements across a range of senses other than audio and visual. Such developments will have significant value and application beyond the porn sector with clear relevance to domains such as video games, virtual worlds and interactive movies.

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