Chapter 69
User Experience in Social Human-Robot Interaction

Beatrice Alenljung
University of Skövde, Sweden

Jessica Lindblom
University of Skövde, Sweden

Rebecca Andreasson
University of Skövde, Sweden & Uppsala University, Sweden

Tom Ziemke
University of Skövde, Sweden & Linköping University, Sweden

ABSTRACT

Socially interactive robots are expected to have an increasing importance in human society. For social robots to provide long-term added value to people's lives, it is of major importance to stress the need for positive user experience (UX) of such robots. The human-centered view emphasizes various aspects that emerge in the interaction between humans and robots. However, a positive UX does not appear by itself but has to be designed for and evaluated systematically. In this paper, the focus is on the role and relevance of UX in human-robot interaction (HRI) and four trends concerning the role and relevance of UX related to socially interactive robots are identified, and three challenges related to its evaluation are also presented. It is argued that current research efforts and directions are not sufficient in HRI research, and that future research needs to further address interdisciplinary research in order to achieve long-term success of socially interactive robots.

INTRODUCTION

Socially interactive robots are expected to have an increasing importance in everyday life for a growing number of people. Lately, there has been an increased number of socially interactive robots in human environments and their level of participation in everyday activities are becoming more sophisticated (Dautenhahn, 2007a; Oh & Kim, 2010; Thrun, 2004). For robots – as for all other types of interactive

DOI: 10.4018/978-1-5225-8060-7.ch069

systems, products, and devices – positive user experience (UX) is necessary in order to achieve the intended benefits. Briefly stated, user experience is about people's feelings, as caused and shaped by the use of technology in a particular context (Hartson & Pyla, 2012; Hassenzahl, 2013), and UX is therefore essential for user acceptance of social robots (de Graaf & Allouch, 2013). If the usage of a robot entails a negative experience for the user, it can have negative consequences, such as reluctance to use that particular robot, or robots in general, erroneous handling, or spreading bad reputation about robots. Therefore, it is essential for robot developers to put serious effort into building robots that users experience as positive. By designing a high-quality interaction with the intended users and usage context in mind it is possible to positively influence that experience (Hartson & Pyla, 2012; Hassenzahl & Tractinsky, 2006).

Positive user experiences underpin the proliferation of social robots in society (Weiss et al., 2009a), and therefore, the user experience of social robots needs to be a central issue of concern. However, a positive user experience does not appear by itself but has to be systematically, thoroughly, and consciously designed for as well as evaluated (Hartson & Pyla, 2012; Hassenzahl, 2013). This clearly highlights the importance of evaluating the quality of the interaction, resulting in evaluations of different aspects: including acceptance, usability, learnability, safety, trust, and credibility. While some of these aspects are covered in depth, some are just briefly touched upon in human-robot interaction (HRI) research. Therefore, each specific robot development project needs to take the UX perspective into account during the whole development process. The field of user experience design (UXD) offers methods, techniques, and guidelines for creating a positive user experience for all types of interactive systems intended for human use (Anderson et al., 2010; Hartson & Pyla, 2012).

The field of HRI is a young but growing research field that is facing several challenges. For example, there is a need to build a foundation of theories, models, methods, and tools. There is in particular a need for new evaluation techniques because human interactions with robots differ significantly from interactions with more traditional, and typically more passive, computer-based artifacts (Dautenhahn, 2007a; Thrun, 2004; Young et al., 2011). It has been proposed that useful inspiration can be derived from the fields of human-computer interaction (HCI) and user experience (UX) (Dautenhahn, 2007b). Currently, robot developers sometimes create their own evaluation methods without sufficient knowledge of appropriate methodologies, resulting in questionable validity and reliability of these so-called "quick and dirty" methods (Bartneck et al., 2009). In this paper, we argue that a good way to proceed in order to address this issue is to adopt existing techniques from HCI and UX, and use these appropriately adapted to HRI. Hence, practitioners like robot developers need research-based guidance regarding how to properly choose and apply UXD techniques and approaches for social robotic products.

The aim of this paper is to address the role and relevance of user experience of socially interactive robots, disentangling several issues related to the evaluation of social human-robot interaction. We identify four trends in HRI research concerning the role and relevance of UX, and we also present three related challenges for the effective incorporation of UX evaluation in HRI. In doing so, we highlight the need for HRI evaluation methods that have methodological validity and reliability as well as practical applicability. Based on that framing, additional research directions are addressed, including a wide range of different perspectives and attributes of UX, the UXD process, and robot products. We advocate an interdisciplinary approach in HRI that would help improve the societal impact of social robots in the long run.

The rest of this paper is structured as follows. First, in the background section, the notions of human-robot interaction, socially interactive robots, and user experience are clarified. Next, four trends