Ethical Frameworks for Artificial Intelligence (AI) and Social Robots in Children’s Healthcare Experiences

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Abstract
This multi-disciplinary project aims to develop and evaluate an ethical, AI-enhanced, socially intelligent robot designed to alleviate children’s distress and pain in a clinical setting. Spanning different disciplines such as HRI, communication sciences, and pediatric research, this workshop aims to explore the ethical implications of the child-robot relationship as it pertains to pain management and robot design, the potential for a pain-reducing social robot and the ethical implications of involving family, healthcare personnel, and children in the co-design of a socially assistive robot. The methodologies used to assess this child-robot interaction will be discussed in relation to both the clinical trial and co-design phases. This is a multidisciplinary project with 4 distinct phases: co-design and usability testing, development of an autonomous system, clinical trials, and an ethical and social implication review. Our method design integrates instruments from communication sciences, HRI design and pediatric research.

Author Keywords
Child-robot interaction; ethical design; socially assistive robotics; co-design methodology

CCS Concepts
•Human-centered computing → HCI theory, concepts and models;


**Introduction**

Children experience pain and distress in clinical settings every day, and the negative consequences of unaddressed pain can be both short-term (e.g. fear, distress, inability to perform procedures) and long-term (e.g. needle phobia, anxiety)[9][10]. In this project, we aim to develop and evaluate a clinically relevant and responsive AI-enhanced social robot. We believe that interaction with a robust, adaptive, socially intelligent robot can effectively distract children during painful clinical procedures, thereby reducing pain and distress. This workshop will allow us to discuss the methods by which such a robot can be developed while taking into consideration the ethics of child-robot relationships.

**Ethical Considerations and Key Challenges**

The impact of AI systems on society is determined by the social role that the robot plays [13], as well as determining an ethical and appropriate means of making its capabilities clear. Existing literature on ethical aspects of AI in the healthcare setting often focuses on AI diagnosis tools [11]. With the increased awareness of AI and other related topics, such as autonomous systems, robotics, or surveillance, the need and wish for more information on the end-user side has also increased.

Some ethical considerations and key challenges in developing the socially assistive robot include: language and cultural challenges in ensuring inclusivity and respect for all peoples and how to account for biases [8]; the moral framework embedded into the creation of the robot and how the relationship between the child and social robot develops and how parents and medical practitioners would like that relationship to develop [2][3][6][7][14]; account for parent and child’s expectations of the robot for any misplaced anthropomorphism and its technical limitations [1][12]; privacy considerations and ensuring transparency in consent and data use, limitations, and destruction if necessary (Livingstone 2018; Li and Park 2020); and creating a collective vision with all stakeholders in the trajectory of human-robot relationships in the future [4][14][15].

**Research Methodologies**

In a recent medical scoping review, potential benefits of using social robots to help children who require short- and long-term hospitalisation, as well as intensive care were found [5]. Most studies in this area used relatively small sample sizes, non-clinical trial designs, and had acceptability as the main outcome; larger sample sizes and more robust, patient-oriented healthcare outcomes are needed [5]. We will employ a wide range of interdisciplinary techniques: the robot behaviours will be developed and elaborated through a co-design approach including all stakeholders; the robot software will be developed using cutting-edge AI techniques, and will be evaluated using techniques from usability testing; the clinical trial will be carried out using standard tools and techniques for such a trial; while the investigation of ethical and social implications will rely on techniques from content analysis.

**Workshop Objectives**

In this workshop our research will explore the ethical implications of the child-robot relationship as it pertains to pain management and robot design. We will explore the potentials for such a pain-reducing social robot beyond the boundaries of the technical limitations of the NAO robot that will be used in our clinical trial testing. This research further will contribute to the workshop by considering the ethical implications of involving family, healthcare personnel, and children in the co-design of a socially assistive robot. The methodologies used to assess this child-robot interaction will be discussed in relation to both the clinical trial and co-design phases.
REFERENCES


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