

Human–Robot Interaction

An Introduction

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Summarized by Michael Wollowski

Distinguishing physical and social interaction

- Key differences between the fields of HRI and robotics:
 - robotics is concerned with the creation of physical robots
 - HRI is concerned with the ways in which robots interact with people in the social world.
- Examples:
 - When the humanoid ASIMO goes up the stairs in a house, it is sensing and acting in the physical world alone and dealing with the physics of its own body and its environment.
 - When ASIMO delivers coffee to a group of office workers, it must also address the social aspects of the environment.
Social rules might be obvious to humans, such as acknowledging the other actors and saying “you’re welcome” when someone says “thank you.”
For a robot, all these social rules and norms are unknown and require the attention of the robot designer.

Human-robot Interaction characterized

- HRI is related to human–computer interaction (HCI), robotics, artificial intelligence, the philosophy of technology, and design.
- The interaction of humans with social robots is at the core of this research field.
- These interactions usually include physically embodied robots.
- Social robots are perceived as social actors bearing cultural meaning and having a strong impact on contemporary and future societies.
- Saying that a robot is embodied does not mean that it is simply a computer on legs or wheels.

Human-robot Interaction characterized

- The robot’s physical makeup elicits people to respond in a way similar to that in which they interact with other people.
- The robots’ human-likeness enables humans to use their existing experience of human–human interaction in human–robot interaction.
- HRI focuses on developing robots that can interact with people in various everyday environments.

Human-robot Interaction characterized

- The dynamics and complexities of humans and the social environment present technical challenges.
- From a psychological perspective, HRI offers the unique opportunity to study human affect, cognition, and behavior when confronted with social agents other than humans.
- Social robots, in this context, can serve as research tools to study psychological mechanisms and theories.

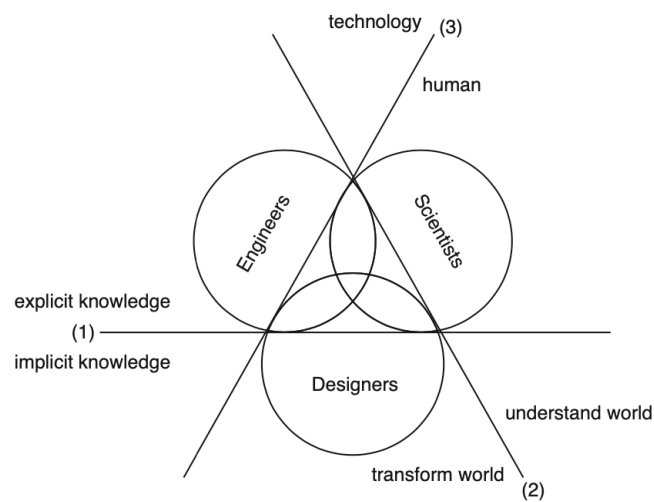
Human-robot Interaction characterized

- When robots are not just a tool but, rather, collaborators, companions, guides, tutors, and all kinds of social interaction partners, HRI research considers many different relationships with the development of society, both in the present and in the future.
- HRI research includes issues related to the social and physical design of technologies, as well as societal and organizational implementation and cultural sense-making.

Multi-disciplinary Nature of HRI

- HRI brings together scholars and practitioners from various domains: engineers, psychologists, designers, anthropologists, sociologists, and philosophers, along with scholars from other application and research domains.

Multi-disciplinary Nature of HRI



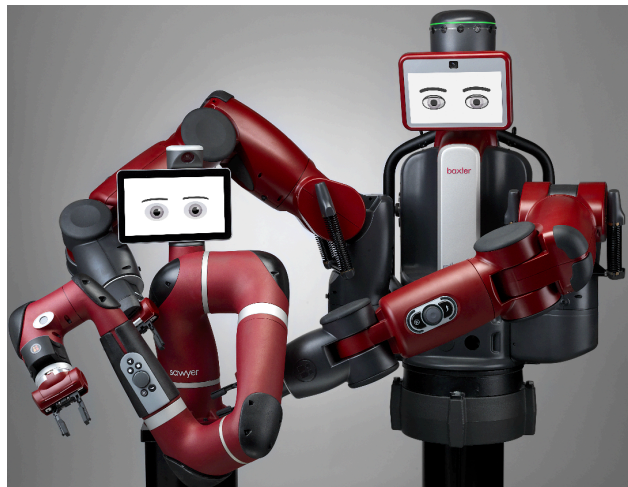
Examples of Social Robots

- Paro (2003–present), a social robot made to resemble a baby harp seal. Paro is provided as a social companion robot.



Examples of Social Robots

- Baxter (2011–2018) and Sawyer (2015–2018), industrial robots with compliant arm.
- Baxter was the first industrial robot to include social interaction features on an industrial manipulator.



Shared Context

- *Shared context* occurs when people or people and machines collaboratively and interactively solve problems.
- It contains knowledge about the problem at hand as well as background and common-sense knowledge.
- In the context of computers, shared context is an artifact that is used to create, record and maintain the various pieces of knowledge and serves to cooperatively solve problems with human collaborators.
- A desirable feature of a shared context is that machines can use it to explain their decisions, situations or perspectives to their human collaborators.
- The machine is expected to develop subjective states that allow it to monitor and report on its interpretation of reality or to understand its human collaborator's perspective of reality.
- Of particular importance to a machine is that the monitoring of its own state may be used to determine whether it has malfunctioned or been compromised.