

# Haunted by Design: Ghost Scenarios in Robotics

Position paper submitted to the workshop titled “Everything Is a Robot (and Nothing Is)” hosted at ACM CHI ’26 in Barcelona, Spain.

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## 1 ABSTRACT

What counts as a “robot” is increasingly contested, yet efforts to define robots often overlook how design practices themselves embed assumptions about the future. Drawing on Lang and Ramírez’s notion of ghost scenarios, we argue that robotic systems materialise often implicit and unexamined contextual assumptions about future labour, care, and human–robot interactions etc. Through examples from industrial and care robotics, we show how these assumptions shape what robots are and what they are expected to do, while foreclosing alternative possibilities. To address this, we reframe robotic design in Human–Robot Interaction (HRI) as a future-oriented practice and draw on the Oxford Scenario Planning Approach (OSPA) to propose four principles for engaging with multiple plausible futures. We argue that futures should not be treated as predictions to design for, but as ways of surfacing, contesting, and rethinking assumptions about future contexts and how they shape the design and function of robotic systems.

## 2 ROBOTIC GHOSTS: ASSUMPTIONS ABOUT THE FUTURE IN DESIGN

Hunting for a consensual definition of what a “robot” is has challenged Human-Robot Interaction (HRI) researchers, particularly in recent years when it has been described as a “moving target” [2]. Recent work has suggested moving away from fixed definitions of robots toward understanding them through practice, meaning that the definition should emerge from the artefact, its context, and its use case at a specific point in time rather than be decided a priori [8]. However, such an approach risks overlooking how practices themselves are shaped by implicit assumptions about the future context, which are embedded in robot designs. Drawing on Lang and Ramírez’s notion of ghost scenarios, we argue that robotic technologies materialise these often unexamined assumptions and that it is helpful for Human-Robot Interaction (HRI) researchers to explicitly challenge them [7].

Ghost scenarios refer to the implicit, taken-for-granted assumptions about future contexts that are reflected in strategic intentions, actions, decisions etc. yet remain largely unquestioned [7]. In robotics, these assumptions shape what robots are designed to do, who they are for, and the roles they are expected to play in society. For example, Boston Dynamics’

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robots are designed to tackle the “dull, dirty, and dangerous” tasks involved in warehouse environments, assuming that undesirable labour will (or should be) automated away [1,9]. This perspective embeds a view of the future where there is a clean distinction between human and robot workers, with robots defined as executors of strenuous physical labour meanwhile humans are recast in supervisory roles. Alternatively, “care” robots such as NAO or Pepper focus on assessments of ageing populations and future healthcare shortages, thus positioning robotic companionship and assistance as an appropriate solution [14].

Left unquestioned and unexamined, these assumptions close off possible alternative robot designs and can hamper their evolution. In the next section, we outline how HRI researchers and designers can proactively challenge these assumptions and address the radical uncertainties of future robotic contexts [5,6].

### 3 DESIGNING BEYOND GHOST SCENARIOS

We argue for a reframing of robotic design in HRI as a future-oriented practice aided by challenging the implicit “ghost scenario” of the future context through scenario-based and speculative methods [4]. Human-Computer Interaction researchers have been engaging more frequently with “futuring” work, and we note that these discussions have been particularly welcomed at CHI [13]. Robots in particular have been the subject of such studies due to their limited, albeit growing, adoption levels [12]. Despite this, much work within this remit remains “largely implicit, techno-deterministic, narrow, and lacking in roadmaps and attention to uncertainties” [13].

An alternative approach is documented in the Oxford Scenario Planning Approach (OSPA) [11] where instead of predicting or optimising for a singular outcome, multiple futures of the context become a resource for reflection: a way to examine how present design decisions embed particular assumptions about the future of labour, care, and human–robot relations, among others. By articulating and contrasting alternative scenarios, designers can identify which assumptions are being taken for granted and consider how different configurations of interaction, roles, and responsibilities may be possible or needed given the radical uncertainty of the future. In this sense, designing robots is not only a technical or interactional challenge, but a process of engaging with multiple possible futures and reflecting on how these shape designs.

Drawing on the OSPA, we set out four principles for productively engaging with futures in HRI. Whilst these are not comprehensive, we intend for these to function as an initial starting point for more engaged futuring work in the HRI space.

1. **Engage with the plurality of futures [3].** The OSPA encourages users to challenge core assumptions in the ghost scenario and generate equally plausible scenarios of the future context [10]. By working with multiple futures, HRI designers can rethink more broadly about what robots might be and what they might do. Thus, multiple scenarios make assumptions both visible and contestable, reframing new possibilities in design.
2. **Use uncertainty and disagreement productively.** In radical uncertainty “we simply do not know” [5] how the future might unfold making forecasts insufficiently accurate to be useful. Instead, by engaging with different perspectives we can explore what might be. This puts productive disagreement and learning at the core of HRI designers work rather than the search for consensus or quick solutions.
3. **Make plausibility the focus.** Several studies have investigated “desirable” futures in relation to emerging technologies [13]. Yet even desirable futures are dependent on plausible outcomes beyond the control of individual HRI designers. For example, might the public push back on living side by side with computers; might people age more healthily and require less automated assistance, etc.? Engaging with such plausible outcomes can help designers achieve what is most desired.

4. **Use the future to reframe options in the present.** The intention of developing scenarios in the OSPA is to provide a way for HRI designers to travel conceptually into the future to imagine what could happen in the context of radical uncertainty. Armed with insights from this ‘travel’, designers can develop new options for their designs in the present. That is, scenarios are not just about exploring the future, but about generating new insights for designers in the present about what their robots could look like, what roles they could serve, and how they might interact with humans.

## 4 CONCLUSION

Defining what a robot is cannot be separated from how we imagine its role in future worlds. While recent work has turned to practice and context, we have argued that these practices are shaped by implicit assumptions—*ghost scenarios*—that become materialised in robotic systems and can narrow what designs are considered possible. In response, we position HRI design as a future-oriented practice that can surface and interrogate these assumptions, drawing on scenario-based approaches to explore multiple plausible futures and reflect critically on present design choices. In this sense, designing robots is not simply about building systems for the future, but about thoughtfully considering which futures are being enacted.

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