Robots are Increasingly: Imagination Crisis in Human-Computer Interaction Research

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Figure 1: A public sign at the university of Stanford indicating the prohibition of flying objects. An evident example on how it is possible to resist robots.

Abstract

Robots are coming for us! There is no escape anymore, AI is inevitable. Worst of all, our skies will be packed with noisy drones, our streets crowded with service sidewalk robots, our homes filled with mechanical companions attending to our children. This critique is a refusal to accept the inevitability of these machines as a premise for our work as researchers. Through a poem composed of opening sentences in robotics papers from the ACM library, I suggest that computing is stuck in a crisis of imagination. Through the example of social robotics, I argue how researchers seem to have surrendered to being either bystanders or servants of the narrow interests of capital; or are simply naively or insidiously perpetuating the motivation for their research agenda. This found poem is a site to create joint calls for unmaking thoughtless notions of acceleration; and beyond that, to challenge the inevitability of capitalist realism. I propose the union for computing alternatives as a movement towards collectively researching computational things otherwise.

CCS Concepts

• **Human-centered computing → Human computer interaction (HCI)**.

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Keywords

increasingly, social robots, human-robot interaction, capitalist realism, technological inevitability

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1 Introduction

Robots are *increasingly* portrayed as *increasingly* present in the world. But are they really, and why is it problematic to promote their inevitability?

In this critique, I stitched together sentences from initial sentences in research articles published in the Association for Computing Machinery (ACM) library into a found poem that paints a picture of a world we most likely do not want to live in[1]. They portray the omnipresence of robots as a reality rather than what it perhaps really is: a justification for the continuation of research agendas dismissing the responsibility we have in creating these same worlds. Indeed, robots may be 'increasingly populating' our world, but it is more important to consider if they *should*. We may, undoubtedly, be spotting more and more side-walk robots transporting goods on our streets, blocking strollers and wheelchairs, but who is benefitting and profiting from them and the space they occupy in an already scarce resource on streets already prioritised for cars?

[1]The articles are not cited individually as I do not intend to critique the authors themselves but rather a collective resistance to thinking otherwise. I condense the articles here in a random order as requested by reviewers:[1, 3–9, 12, 14–16, 18–32, 34, 37, 38, 38, 40–43, 47–57, 59–61]

This poem uses the field of social robotics as an example of a problematic stance fairly common within Human-Computer Interaction (HCI). Although robots are portrayed as 'increasingly' present in the world, most examples of social robots are restricted to research environments, whereas real-world widespread application of the technology is not particularly social and even arguably deeply harmful—as is the case of drones. Insistence on perpetuating the idea of robots' increasing presence (and consumption) is not only untrue but also damaging to our capacity to collectively imagine alternative worlds. Concerningly, a robotics paper even states this very effect: *"Intelligent systems are increasingly part of our everyday lives and have been integrated seamlessly to the point where it is difficult to imagine a world without them"* [39]. In this critique I describe two perspectives, starting with noting that in fact, many robots are increasingly decommissioned; followed by one case of research on the notion of social drones as heavily problematic. These two examples serve only as a gateway towards a critique that is applicable to the broader field of HCI: while social robots are used as an example, any other technology could be searched in the library for the same exact symptom[2].

Realistically, social robots are not as widespread as portrayed, and cases where they are increasingly present may send clear signs that they should be imagined otherwise. Building on resisting technological inevitability and capitalist realism, I suggest a need for fully avoiding the discourse of 'technology is increasingly' in our research. As a provocation; I suggest the unionisation of HCI researchers against the tyranny of the inevitable.

1.1 Social Robots are Increasingly Discontinued

In reality, social robots are increasingly decommissioned, discontinued, or unfunded. Remarkably, even a bibliometric analysis that highlighted a significant increase in publications on social robotics opens its abstract with. "As robotics becomes ubiquitous, there is increasing interest in understanding how to develop robots that better respond to social needs, as well as how robotics impacts society. This is evidenced by the growing rate of publications on social robotics" [36]. The leap between an increase in publications as equal to a more widespread presence of the robots themselves is at best misinformed. At worst, just a mechanism to justify the continuation of navel-gazing research agendas.

When looking at actual social robots, we can find a myriad of cases that challenge their widespread state. Jibo, introduced in 2017, was designed as an interactive social robot for home use. Despite initial enthusiasm, the company faced significant financial challenges. Ultimately, the company was unable to secure the necessary resources, leading to Jibo's discontinuation, and in the downfall, leading to widespread disappointment in their careless shutting down of the servers, leaving the robot bodies rendered useless. A new wave of funding was announced in 2020, does not appear to have resulted in any updates[3]. Similarly, Moxie was a robot produced to help children develop social and emotional skills. Marketed at 800USD, it has recently been abruptly discontinued without any refunds or plans to keep the servers operational. Even fairly successful robots such as Anki's Cosmos have been discontinued due to financial trouble[4].

Most humanoid robots described as increasingly present are seldom seen outside the research context. Unsurprisingly, the production of Pepper, a popular humanoid social robot within Human-Robot Interaction (HRI) research, has been halted in 2020. According to Reuters[5], allegedly Pepper has been a money-losing proposition since it was introduced. Another popular robot, NAO, seems to be mostly acquired for research and used in that context. A review of its use after 10 years notes that "researchers tend to skip the details of why they choose NAO over other social robots except acknowledging its wider use" [2], noting also that in truth, NAO is severely lacking in autonomy. This means the robot is predominantly used in a wizard of oz setting [2], where there is a human controlling the robotic behaviour—hence it is questionable whether they are really robots or just a pretence to reinforce the narrative of inevitable general artificial intelligence.

There are, of course, relatively successful robots. Most of all, lawn mowers and vacuum cleaners, and even factory arms or surgery robots. Not exactly the most sociable. There is niche interest in pet-like robots. Sony's AIBO[6], a robotic dog launched by Sony in 1988, was discontinued due to poor sales and restructuring. A new version of the robot was introduced in 2018, and is fairly successful nowadays despite its high price tag—but far from ubiquitous. Paro[7], a robotic seal designed for therapeutic purposes, particularly for elderly individuals with dementia or Alzheimer's disease, has been around since 2003 and still in production, albeit also with a prohibitive price.

Yet, new robots are continuously developed possibly as a way of keeping the narrative alive. Some remarkable examples are Amazon's Astro[8], Samsung's Ballie[9], or LG's robot that allegedly brings their 'Zero Labour Home'[10] vision to reality. *Perhaps, social robots are increasingly used as PR devices.*

1.2 Drones: Some Robots are Increasingly Problematic

The same critique applies to the project funding this paper (or well, funding me as a researcher), which is centred on what the original authors called "*The Rise of Social Drones: A Constructive Design Research Agenda*". As per the official website: *"Drones are expected to become an* ***increasingly common tool*** *in our everyday lives... Social drones are expected to be part of society in the same way as cars and technological aids are today"*[11]. This effect is notable enough in the fact that I also stated that *"the spectrum of applications for*

[2] I have had colleagues try 'AI is increasingly' for overwhelming results.
[3] https://www.theverge.com/2020/7/23/21325644/jibo-social-robot-ntt-disruptionfunding
[4] https://www.wired.com/story/embodied-will-brick-moxie-emotional-support-robot-for-kids-without-refunds/
[5] https://www.reuters.com/technology/exclusive-softbank-shrinks-robotics-business-stops-pepper-production-sources-2021-06-28/
[6] https://us.aibo.com/
[7] http://www.parorobots.com/
[8] Available only by invitation! https://www.amazon.com/Introducing-Amazon-Astro/dp/B078NSDFSB
[9] https://news.samsung.com/us/samsung-ballie-ai-companion-robot-home-video-ces-2024/
[10] https://www.lg.com/us/press-release/lg-ushers-in-zero-labor-home-with-its-smart-home-ai-agent-at-ces-2024
[11] https://wasp-hs.org/project/the-rise-of-social-drones-a-constructive-design-research-agenda/

social drones is broadening as they become an increasingly accessible technology"[13] in one of my earlier papers.

Sadly, in this case, perhaps we can agree. Drones are indeed a robot with growing presence in society. The problem here being that we seem to not be able to do anything about it, even if we would want to. Even if robots are indeed increasingly present in our daily lives—and evidently not all bad—the question should still be whether or not we want them to. Some of the robots that are becoming widespread should be a cautionary tale: drones are a poignant case of increasingly harmful robots.

In the subfield of HRI called human-drone interaction (HDI), there are similar inevitabilities: *"Drone activities in our daily lives **are on the rise**, so is the need to advance research on how to design drones that can interact with human users in an autonomous and socially acceptable way"*[46]; *"Domestic robotic entities **are on the rise**, out of which, domestic drones are taking place in our society as one of the upcoming interactive technologies that we will see in our daily lives"*[44]; *"Gestural interaction with flying drones is now **on the rise**; however, little work has been done to reveal the gestural preferences from users directly"*[45]. **The casual use of phrases like "on the rise," "are becoming," or "are increasingly" surrenders both researcher and research to a portrayal of the world beyond their capacity to change or influence—a quiet resignation disguised as observation.** Given how damaging the presence of drones is in the world, we may be fooling ourselves at the notion of a benign human-drone *interaction* beyond either being surveilled or killed.

In Palestine, particularly in the besieged Gaza Strip, Israeli drones are not merely a tool of surveillance or military precision—they are instruments of occupation. Their constant presence in the sky, known by the Palestinians as *Zanana*, transforms everyday life into a state of permanent exposure and fear. In November, the baffling account of Nizam Mamode, a Gaza surgeon, described an *interaction* with a quadcopter. He described the horrifying experience of being hovered over and shot by them[12]. Drones are not just 'on the rise'—they are actively deepening what many scholars and human rights organisations identify as a colonial condition. Israel's deployment of drones enables a form of remote governance and domination that extends the logic of settler colonialism: exerting control without physical presence, enforcing discipline through the automation of violence, and fragmenting Palestinian life via constant aerial oversight. As such, the increasing use of drones does not merely reflect technological escalation; it facilitates and intensifies the apparatus of occupation, allowing it to become more insidious, normalised, and detached from accountability.

The use of commercial drones for military purposes—the exact same drones often used in HDI studies—is widely known[13]. DJI, the Chinese drone manufacturer, has faced scrutiny over its stance on the Russia-Ukraine war. While DJI has officially stated that it opposes the use of its drones for combat purposes[14], it still maintains a 'neutral' stance on the conflict. Additionally, the company has attempted to deflect blame by emphasizing that it cannot control how its products are used after purchase. However, other tech companies facing similar dilemmas have taken more decisive actions, such as geofencing technology or terminating services in conflict zones—although they would likely be quickly circumvented. DJI's limited efforts in restricting drone access suggest either a lack of commitment or a deliberate effort to maintain market share while avoiding direct political entanglements. Despite these critiques, in 2024, DJI released a new drone with a payload capacity that would allow for even larger explosives to be transported at a much lower price. Yet, precisely the same drones are still used in research, portraying drones as "on the rise" with a vaguely beneficial narrative of user-friendly interaction appended.

In late 2024, the United States experienced a surge in reported drone sightings, mostly along the East Coast. Over 5,000 sightings were documented during this period, leading to public concern and extensive media coverage, and pressure towards regulation[15]. A recent article by Zenz and Powles argues that the technology industry often promotes narratives of technological inevitability to advance new markets, frequently overlooking societal consequences. In Canberra, Australia, residents resisted this narrative by voicing concerns over noise pollution, safety, and privacy. Their organised activism led to Google Wing ceasing operations in the area and prompted a parliamentary inquiry into the oversight and consequences of drone delivery technology [58]. They claim that Google used the myth of inevitability to lead into 'community acquiescence', hoping citizens would be more tolerant to the presence of drones, which could be interpreted as widespread 'acceptance' [58].

Similarly, Shoshana Zuboff's *"The Age of Surveillance Capitalism"* [62] offers a critical examination of how big tech companies, such as Google and Meta, have developed a new form of capitalism based on the extraction, commodification, and monetisation of personal data. Zuboff defines surveillance capitalism as an economic logic where human experience is treated as free raw material for hidden commercial practices of prediction and behavioural manipulation—a practice that the field of HCI must consciously stay away from. HCI, despite its user-centred ethos, often plays a central role in sustaining this paradigm by inadvertently reinforcing the structures of surveillance capitalism, making them feel natural, inevitable, and even desirable. If researchers take their role of citizens and consumers somewhat more seriously, their refusal to surrender would be instrumental to the dismantling of further initiatives to escalate the presence of harmful technologies—or even escalate the imaginary of escalation.

2 Technological Inevitability and Capitalist Realism

Our imaginaries of the future are haunted by a myriad of factors—but none worse than inescapable technological determinism. In this view, technology is often seen as an autonomous agent of change with intrinsic power to influence human lives and institutions. We have looked into social robots—and in particular the idea of social drones—to make a case for how misinformed such determinism can be; and definitely is spread throughout the wider field of HCI. The example of social robots is but one in a myriad of other technologies

[12] https://www.bbc.com/news/articles/c7893vpy2gqo

[13] https://www.forbes.com/sites/davidhambling/2022/04/29/small-quadcopters-rule-the-battlefield-in-ukraine—which-makes-their-chinese-manufacturers-very-unhappy/

[14] https://www.dji.com/newsroom/news/dji-statement-on-military-use-of-drones

[15] https://nypost.com/2024/12/14/us-news/nearly-1k-drone-sightings-reported-in-nj-in-less-than-a-month/

being portrayed in similar ways, with the same techniques and discourses.

Markham gives a fantastic summary of how discursive closure and technological determinism feed the notion of inevitability and proposes ways of overcoming their perceived powerlessness at the hands of a world dominated by forces too big to be grappled with [33]. She suggests that researchers, through their work and discourse, are engaging in mundane activities of 'world-making' which influence the possibilities we see and seek to to inspire aspiration rather than just speculation [33].

A focus on technology may hinder the possibility of imagining profoundly revolutionary worlds—perhaps even those with less computation. The expansion of methodologies revolving around fiction and speculation—or what Donna Haraway would call SF [16]—is unsurprising in a world where we no longer feel like we can truly imagine and act towards doing differently or otherwise. The poem appended is explicit in this 'world-making', portraying robots as omnipresent.

We seem to be stuck in not being able to aspire for something else different under the iron hand of capitalism. In Ursula K. Le Guin's famous and inspiring words: *"We live in capitalism. Its power seems inescapable. So did the divine right of kings. Any human power can be resisted and changed by human beings. Resistance and change often begin in art, and very often in our art, the art of words."*[17]

As academics and researchers, much of our power is in words, but within design and HCI, it is also in the technologies we enable and frame as inevitable. This becomes particularly problematic when we research articles that uncritically feed the narratives of an unstoppable acceleration of technology.

Mark Fisher's book *"Capitalist Realism"* [10] explores the pervasive dominance of neoliberal capitalism and its ability to define the cultural, political, and social imagination of contemporary society. Central to his argument is that capitalism has become so entrenched that it feels like it is the only viable political and economic system. This crisis of imagination is made even deeper when researchers admittedly presume that 'robots are increasingly'. In this context, assuming technology as inevitable, is actively preventing worlds where collective action is possible and realistic to imagine. Fisher draws from Margaret Thatcher's infamous phrase "There is no Alternative", which enforces the belief that no credible alternative to capitalism exists. This stifles imagination and discourages efforts to envision or pursue systemic change. The same argument is used when HCI insists on the only path forward being of 'more' computing, with researchers contributing to a "brutally self-fulfilling prophecy" [10] where alternatives are just simply not rational. While it may seem like nit-picking to hang on to the opening of research papers, in his words: *"The tiniest event can tear a hole in the grey curtain of reaction which has marked the horizons of possibility under capitalist realism. From a situation in which nothing can happen, suddenly anything is possible again"* [10, p.81].

3 Computing Imagination Crisis: Resisting Inevitability

The issue of the 'increasingly' is definitely not limited to HRI. Anyone within the field of HCI will notice that it is suspiciously common[18] to open an article by stating the technological inevitability of the technology it studies.

The core of the issue here is beyond the statement of inevitability, it is what follows—the perpetuation of the exact same status quo without troubling that inescapable presence, or offering alternatives. This usually takes the form of a fabricated research gap that is presented not as a troubling matter that should be researched as the result of a system but as a problem to be patched up. If we assume we will stumble upon social robots in elevators, then, of course, it begs the question and requires research money to properly assess how those encounters should unfold. However, such a concocted research gap is more self-serving than contributing to desirable progress, it does not reveal instead the possibility to find the tiniest event that could tear a hole. By not showing the tiniest fissures in capitalism, we are more likely to surrender to the effects of a technology we have convinced ourselves we cannot escape—or worse even—rely on existing for our research grants. Effectively, we could be at a standstill, because questioning capitalist realism could represent the downfall of HCI.

Tying back to Mark Fisher and his later work, "Ghosts of My Life" [11], explores themes of loss, nostalgia, depression, and the concept of 'hauntology' (building on Derrida). Fisher mourns the absence of radical, forward-thinking cultural movements, noting how capitalism has flattened time, trapping society in an endless recycling of the past. What we see in the inevitable narratives of robotic futures is often a retelling of past imagined (often colonial) futures rather than possible alternatives or new imaginations. It is the role of academia to contribute to cultural movements that do not reinforce existing power structures. To that end, we must abolish uncritical "robots are increasingly"—capitalism has succeeded in making its dominance appear inevitable, leaving no space for the expression of collective alternatives—such as those where we have more time for caring for our children rather than outsourcing childcare to robots. A world where we have time to offer mutual aid and guide each other. A world where robots are not appearing, or being deployed, introduced or permeating, embedded or operating, entering or being exploited, but rather mindful and carefully weaved into where they are most needed. A world where we do not obfuscate the political and systemic issues that are causing the problems we haphazardly try to patch with technology. What HCI may need is a good exorcism of the 'hauntology' of capitalist realism in order to more openly and systematically resist inevitability in ordinary discourse.

[16] For Donna Haraway[17], SF—short for science fiction, speculative fabulation, and string figures—is a way of imagining and storytelling that challenges conventional ways of thinking about science, technology, and identity. It's not about predicting the future, but about creatively exploring alternative possibilities and complex entanglements between humans, machines, animals, and environments. SF encourages us to think otherwise by breaking down rigid boundaries and inviting us to inhabit worlds that resist dominant narratives. In this sense, SF is both a playful and serious tool for imagining futures beyond the limits of current systems.

[17] I recommend watching the whole speech:
https://www.youtube.com/watch?v=s2v7RDyo7os

[18] Warning—reading this critique will actually likely make you quite sensitive to these sentences. I have recently been showered with links to papers from my colleagues with similar formulations. I have even written them myself plenty of times. There is nothing inherently wrong with the word itself, but it is important to reflect on its use as a world-building device, influencing the perception of readers. Through our academic writing we construct these worlds—an act of responsibility.

4 Unionising for Computing Alternatives

Not all is grim. I propose that there is a possible pra(x)is to engage with in order to recover some of our capacity to research and promote computing alternatives. In his book "Resisting AI: an anti-fascist approach to artificial intelligence", McQuillan offers a critical examination of the rise of artificial intelligence (AI) and its entanglement with political power, especially in the context of fascism, authoritarianism, and surveillance capitalism [35]. All computational matter is deeply entangled with political, social, and economic systems that often perpetuate injustice, so the capacity for imagination is fundamental to leap out of the trap of inevitability. To tackle such a huge issue, McQuillan suggests the role of for example workers' councils. As he notes "worker's councils operate as one of the initial formations of alternative sociality founded on wider ideas of care, mutual aid and solidarity" [35].

Within academia, the wheel does not have to be re-invented. We have tools available through (albeit flawed) methods of peer reviewing and critiquing. What we need to become better at is commoning and solidarity, aligning ourselves with the idea of worker's council. Our labour as researchers is a valuable and important endeavour. However, possible alternatives cannot rest on the shoulders of a an individual researcher, they require a diversity of perspective and standpoints, starting one researcher at a time. The papers mentioned in the poem are purposefully not cited as individual calls for responsibility would be unproductive. It is probable that much of the research is needed as a means to justify a grant, hiring of PhD students, or the acquisition of robotic equipment to a lab, for example. Disingenuous research gaps and artificial empty arguments should not need to exist—yet I hesitate to simplify the problem towards an agenda to reject research that does not critically engage with the acceleration of technology. With a variety of academics in distinct positions of power, it may feel less daunting to resist determinism and find common ground.

I suggest that we can unionise for computing alternatives as a speculative move—in line with the imaginary practices of SF mentioned above—to help each other see beyond what we inadvertently portray as inevitable. I suggest turning instead towards researching what *should* be increasing or discontinued, without fear of jeopardising our own research field or careers[19].

As many other professionals do, so can researchers in computing agree to a code of conduct or a common goal. Physicians are expected to take the Hippocratic Oath to avoid harm—it is reasonable to expect many other professionals to make equally important commitments to avoiding contributing to the harm already escalated by computational matter. The *Union for Alternative Imagining in Human-Computer Interaction* must be collectively defined, but I suggest the following code of conduct as a starting point:

- We, the scholars, practitioners, and thinkers of HCI, unite in a collective act of refusal. We refuse the dominance of capitalist logic in shaping the future of computing. We reject the pervasive narrative that the trajectory of technology is inevitable, that progress is defined by profit, and that human experience must adapt to the cold logic of machine-driven systems.
- We describe the tools we create, the systems we study, and the environments we design as not neutral—making transparent how they are shaped by the values, politics, and ideologies we can imagine and embed in them.
- We declare that the future of HCI should not be determined by the demands of a capitalist market, nor by the constraints of technological determinism. It is shaped by the choices we make as researchers, as academics, as citizens of a global, interconnected world.

We assert:

- That technological progress is not inevitable. Every innovation, every interface, every algorithm, is a product of human imagination.
- That HCI must be a space for critical inquiry and imaginative exploration. We refuse the tendency to frame technology as a neutral tool or an uncontrollable force. We push back against simplistic narratives of 'progress' and 'innovation,' and instead ask what alternatives we can imagine.
- That we reject the neoliberal, extractive nature of the tech industry and instead seek to promote and study systems for collective liberation.

We pledge:

- To develop alternative ways of computing that resist the monopolistic control of corporate interests and the dominance of surveillance capitalism. We will design systems, interactions, experiences and futures that are open, ethical, and decentralised. We do this by only reflectively acquiring and researching products produced by companies, ensuring we do not contribute to their mindless expansion.
- To reject the premise that technological progress is a one-way street, determined solely by the interests of industry. We will challenge the notion that the future is already decided, and instead, we will shape a future where technology is designed or undesigned to serve humanity, not profit.
- To take ethical responsibility for the futures we shape through our narratives.
- To create emergency exits for those who do not see or have alternatives, and help them practically with escaping those realities through compassion.
- To critically, yet compassionately, question our own assumptions and the assumptions of others through peer review, kindness, and friendship—and avoid at all costs the portrayal of technology as inevitable in our work.

We propose:

- Alternative research outcomes such as democratic tools for dismantling, boycotting, and sabotaging.
- Mutual aid as a means to obtain independent funding.
- Encouraging activism as an academic practice.
- Teaching our students to think otherwise.

[19] Although we should be open to also imagining the possibility that HCI should no longer grow when we find irredeemable harm in our practices.

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