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Ahlin, T.

Citation

Ahlin, T. (2026). Socio-technical imaginaries of social robots for older adults. *Economic And Political Weekly*, 61(9), 99-104. doi:10.71279/epw.v61i9.48327

Version: Publisher's Version

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Socio-technical Imaginaries of Social Robots for Older Adults

A Review

TANJA AHLIN

Although social robots are promoted as a technological solution for ageing populations, their development and integration are challenging. This paper analytically reviews social science research on social robots for elder care in two different socio-economic and political contexts, the Netherlands and India, focusing on socio-technical imaginaries in media, research, and policy. Grounded in science and technology studies, the notion of socio-technical imaginaries presumes the mutual shaping of technologies and people's imagination. However, socio-technical imaginations of states, roboticists and the intended robot users are not always aligned.

Global digitalisation trends in health and long-term care are shaped by a remarkably common storyline: that the combination of ageing populations and decreasing human and financial resources is leading to a care crisis. The number of people older than 60 years is projected to double from 1.1 billion in 2023 to 2.1 billion in 2025. This translates into 22% of the global population, with more than 80% living in low- and middle-income countries (WHO 2024). Simultaneously, WHO (2025) projects a shortfall of 11 million healthcare workers, mostly but not exclusively in low- and middle-income countries, due to chronic under-investment in education, employment, deployment, and retention of staff. Even in wealthy regions such as Europe, there is a shortage of healthcare workers, which WHO (2022) describes it as “the ticking time bomb,” as 40% of doctors are close to retirement, while the number of nurses is decreasing due to poor work conditions and post-pandemic mental health struggles. These circumstances have been creating a gap between the needs of ageing populations and the government's ability to cater to them, with detrimental effects on the quality of elder care.

Elder care touches on the intersection of demographic, economic, moral and political transformations, and hence represents a critical site of social policy debate. In policy, the global care crisis is commonly addressed through innovative technological interventions (Peine et al 2015). Digitalisation, whether in the form of telemedicine, smart-home technologies, wearable devices, mobile applications or remote monitoring systems, is presented as crucial to support ageing populations. Gerontechnologies (technologies designed specifically for older adults) have been described as a “triple win,” since they could potentially benefit older people, the economy, and society at large. This discourse has also been criticised for contributing to a negative view of ageing (Neven and Peine 2017).

Among gerontechnologies are care robots, encompassing a wide variety of devices ranging from assistive robots, which support people in mobility, to social robots whose main function is social interaction to combat loneliness and isolation. Such “carebots” have been lauded for their potential to support health and long-term care organisations (Florek 2023). For this reason, governments have employed different funding strategies to stimulate robot development. In Japan, for example, robots have been promoted as a substitute for care workers,

Tanja Ahlin (tanja.ahlin@gmail.com) is at Leiden University, the Netherlands.

which would solve the growing care labour shortage, while decreasing the need for migrant care workers (Wright 2019). However, ethnographic research has shown that these technologies cannot replace carers, but instead introduce new issues, such as increasing workload for carers, deskilling of care labour, and rising overall costs (Wright 2023).

This paper offers an overview of the scholarly literature on social robots for care in India and the Netherlands. It focuses on “socio-technical imaginaries” (Jasanoff 2015) as they emerge in media and research on social robots. In policy, socio-technical imaginaries are discussed in relation to artificial intelligence (AI). Having a grasp of these imaginaries is key to envisage how social robots for older adults could feature in the broader political-economic projects of welfare reform and digital information that are currently underway in India, the Netherlands and other countries around the world.

Co-production of Society and Technology

Technological innovation is a deeply political process, in which science, technology, the state and society are intricately related (De Togni 2024). The guiding theoretical approach for this review stems from science and technology studies (STS), where technologies are understood not just as neutral tools that people use to achieve certain means, such as care, companionship or communication, but as objects that are imbued with and generate particular social relations, values and politics (Bijker and Law 1994). The STS notion of socio-technical co-production emphasises the two-directional dynamic of influence and mutual co-constitution between people and technologies (Jasanoff 2015: 3). Care robots form an integral part of political, economic, and social discussions and practices, such as health-care and long-term care financing and organisation, and even migration policy. Therefore, they are not just technical devices, but also social and political objects (Lipp and Maasen 2022). What care robots are and how they enter and shape social relations is fluid and situational, as their (non)use depends on who interacts with them, where, in which moment, and how (Ahlin and Mann 2025; Felding et al 2024).

Because the relation between people and technologies is one of co-production, technologies—including social robots—both shape and are shaped by people’s imagination (Šabanović 2010). In STS, socio-technical imaginaries have been described as “collectively imagined forms of life and social order reflected in the design and fulfilment of nation-specific scientific and/or technological projects” (Jasanoff and Kim 2009: 120). Rather than being limited to nation states, socio-technical imaginaries can also be articulated by groups such as corporations, social movements and professional organisations (Jasanoff 2015: 4). Within these collectives, socio-technical imaginaries perform a double role: they hold ideas about what kinds of technological futures are desirable and how to achieve them.

Methodology

This paper reviews the social science literature on care robots for older adults in India and the Netherlands after 2000, when the first such social robots began appearing, like the

Sony-produced dog Aibo and the Japanese-designed seal Paro (Akinori 2010; Shibata and Tanie 2001). Rather than aggregating measurable evidence through a systematic review, or building on one’s own empirical data, this is a state-of-the-art analytical review (Snyder 2019). This approach is most suitable to interpret and synthesise ideas, compare frameworks, debates and contexts, and critically examine the theoretical, political, and social dimensions of a phenomenon. It is also a fruitful method to create an overview of newly emergent fields where studies are conceptually diverse and methodologically mixed. Instead of covering all existing literature on social robots, the purpose is to combine perspectives and insights from different fields and sources, bringing together methodologically and theoretically diverse literature.

Comparing India and the Netherlands is useful due to their contrasting welfare and technological infrastructures, policy frameworks, and cultural attitudes towards robots. The Netherlands is a world leader in innovative elder care and dominates technological innovation in the European Union (EU). It is among the top 10 countries in the world in terms of technology spending, with 75% of national technology investment dedicated to software and services, and is the eighth largest technology market in terms of spending in the EU (Montalbano 2021). India, by contrast, has only recently started to develop a strategy for technological manufacturing, research and development with a view for attaining self-reliance and becoming a global market force (Jaishankar and Sirkar 2024; Mani 2025). Despite a relatively recent orientation towards technological development, India is already at the forefront of the uptake of industrial robots, ranking sixth in the world in terms of annual installations (International Federation of Robotics 2025). Following the publication of the National Health Policy in 2017, which recognises the significant role of technology in healthcare, studies have been emerging to evaluate the viability of AI—including robotics—for health and elder care in India (Sarbhadhikari 2019). Deo and Anjankar (2023) consider robots for health to be in the “infant stage” but also emphasise that “it is not possible to think about implementation and monitoring of health services in the absence of AI and robotics.” This is also the case for socially assistive robots (SARs) for care for older adults (Abdi et al 2018).

Fiction and Media Representations

The word “robot” originates from a science fiction play, *RUR—Rossum’s Universal Robots*—written in 1920 by the Czech playwright Karel Čapek, who pictured robots as replacing human workers (Čapek 2023). However, tales of mechanical animals and humans—“robots that predate the word ‘robots’” (Indurkha et al 2025)—are much older and can be found in the ancient texts of Egypt, Greece, Tibet, Mongolia and China. In India, androids were depicted already in Sanskrit and Pāli literature (Cohen 2024).

Today, discussions of AI appear commonly in Indian science fiction, especially in films (Wang et al 2023). Robot-related fears, ethical dilemmas and legal concerns have seeped into Indian cinema, influenced by its Hollywood counterpart, by

reproducing themes such as the robot turning on its creator (Mukherjee 2024). Several films explore the Indian visions of socio-technical futures and ageing through human-machine interaction (Karmakar and Sarkar 2023). Babjan and Kishore (2025) analyse two films in which the main protagonists are older men living by themselves who obtain robot companions. In *Anukul* (2017), based on a short story by Satyayit Ray, an upper-class, urban-dwelling teacher purchases an android robot, indistinguishable from humans by its looks, as a housekeeper and companion. The film depicts the problem of non-demanding, obliging robots replacing fallible human workers.

Anukul departs from the Western narrative by grounding the moral education of the robot in the Hindu mythology, thus shaping the robot according to the Indian philosophical framework. The Indian context matters differently in the comedy *Android Kunjappan Version 5.25* (2019). Here, an older man receives a robot, a small humanoid sporting a white plastic shell, as a gift from his migrating son as a replacement for himself. Despite a strong initial resistance, the old man eventually accepts the robot and even forms “a father-son bond” with it (Babjan and Kishore 2025). Both these films navigate between the extremes of utopia and dystopia, leaving the viewer ambivalent towards robots and puzzled with questions about trust, safety, ethics, and human nature (Nanda 2025).

Dutch films, too, include several with robots, but none feature care robots, nor have these films been analysed academically. However, a documentary *Ik ben Alice* (I am Alice, 2015) presents a girl-shaped robot developed in a private-public partnership of Vrije Universiteit and Deloitte for companionship for older adults. The Internet Movie Database (IMDb 2025) describes this multiple-award winning documentary as follows: “In order to meet future care demands for elderly who are lonely and suffering from dementia, carebot Alice has been developed.” Despite being portrayed in the documentary as a highly advanced robot which can communicate flawlessly, the project had difficulties finding investors and Deloitte finally decided not to place the robot on the market (Robot-bond 2025). Eventually, Alice “died a silent death” as the project was discontinued (Jansen 2024). In a news interview, one researcher shared that she had felt “ashamed” because, in reality, Alice could not do much at all: the words uttered through the robot were typed by a person sitting in another room (Jansen 2024). Although featured in a documentary, Alice, as an autonomously conversational robot, was closer to fiction than reality.

Socio-technical Imaginaries in Policy

Current policies do not focus explicitly on care or social robots in India and the Netherlands; however, AI governance, particularly in healthcare, is an important concern in both countries (Bouderhem 2024; Naik and Reddy 2025). Technological strategies and “visions” are addressing AI more broadly, for example, in the parliamentary document *Government-wide Vision on Generative AI of the Netherlands* (Government of the Netherlands 2024). In 2022, the Dutch government started with the programme *Wonen, Ondersteuning en Zorg voor Ouderen* (wozo; Living, Support and Care for the Elderly), which promotes

older adults’ independence, living at home and the use of digital technologies (Ministry for Health, Well-being and Sports, 2022). The programme mentions social robots as an example of including digital technologies in elder care. Further, the *Human Rights in the Robot Age* report (van Est and Gerritsen 2017), developed by a Dutch think-tank, issued recommendations to the Council of Europe. The report highlights several potential harms of care robots for older people, such as increased emotional and physical dependency and loss of dignity. The report also suggests two novel human rights: the right not to be measured, controlled or analysed, and the right to meaningful human contact.

The Dutch *Strategic Action Plan for Artificial Intelligence* (Ministry of Economic Affairs and Climate Policy 2019) is grounded in a depoliticised imaginary of AI, envisioning the private sector as leading AI development and application with the government and academic sector supporting this process, while citizens and societal partners play little role (van der Wel 2021). The Dutch government tends to have a so-called “polder approach” to emerging technologies, whereby a broad range of actors (policymakers, experts, private parties, representatives from societal organisations and citizens) are engaged in negotiation until some sort of compromise and consensus is reached (van Dijck and van Saarloos 2017). However, van der Wel (2021) argues that in the case of AI, depoliticisation was used to steer away from “poldering,” and therefore, public debate depicted AI as “an apolitical ‘economic technology that should be used rather than discussed.’” Placing AI outside of the realm of politics promotes the image of technology as a neutral tool that can, and should, be applied across all economic and societal sectors, with no need for debate.

The Dutch government’s socio-technical imaginaries of AI in healthcare were analysed through the policy programme Valuable AI, an exponent of the Dutch National AI strategy, which was established during the COVID-19 pandemic (Hoff 2023). Hoff (2023) identifies three tactics through which the government shares its vision of AI: legitimisation, promotion and reassurance. First, the government legitimises the use of AI in healthcare by presenting this technology as a “natural” development that is necessary to solve societal problems, such as a lack of healthcare staff. Second, it presents AI as crucial for better care, promoting its use as a professional value and even “duty.” Third, it dismisses potential doubts by reassuring healthcare professionals that AI will not affect their authority and positions. Similar to van de Wel (2021), Hoff (2023) argues that presenting AI as inherently valuable leads to “discursive closure” or shutting down the option to think otherwise. AI governance, Hoff claims, therefore lies not only in crafting regulations, but also in managing people’s affective responses through specific socio-technical imaginaries in policy and policy communication.

In India, a milestone in the spread of digital technologies was the Digital India Policy, launched in 2015 (Government of India 2025). The programme envisions the development of a national digital infrastructure, the establishment of digital governance and economic services, and the promotion of

digital literacy. However, as Gurumurthy et al (2016) show, India's digital agenda is neither monolithic nor technologically "aseptic," but provides a particular imaginary of a digitally empowered society wherein India aspires to compete in a global marketplace. This has also been confirmed by analyses of socio-technical imaginaries in newspapers, which showed that in contrast to the United Kingdom, the Indian and Chinese media focus on AI as an economic opportunity rather than a threat (Wang et al 2023: 14).

The digital agenda and the discourse promoting AI are grounded in authoritarian neo-liberalism, "through which governments and elite social groups start relying on direct exclusion and nondemocratic practices rather than hegemonic control" (Gurumurthy et al 2016: 373). This strategy serves to separate the capitalist state from social and political questions, such as gender equality. The vision embedded in the discourse on digital India is narrowly framed in neo-liberal and masculinist terms, while silencing structural inequalities, particularly of gender, and overlooking alternative imaginaries of empowerment that would "emphasise the connection between women's online participation and their equal status as economic and political agents in society" (Gurumurthy et al 2016: 394). These analyses suggest that the Indian digital transformation is guided by a future vision, which prioritises economic competitiveness over socially redistributive or justice-oriented goals.

Socio-technical Imaginaries in Research

Robotics' imagining what a robot is and how it could support care is significant for robot development (Breuer et al 2023; Vallès-Peris and Domènech 2020). Further, people's responses to robots are grounded in how they have been sensitised to robots—and their potential users—through images appearing in various media. The imaginaries of intended users can conflict between robot designers and test users. In the Netherlands, older adults who participated as robot test users did not see themselves in the designers' image of "the elderly" who would want and need a care robot (Neven 2010). The test users refused to be associated with news images of frail, very old people in wheelchairs, living in retirement homes; instead, they presented themselves as active, helpful, and independent. They could imagine the robot as useful for other people, but not themselves. However, the designers failed to incorporate these findings into robot (re)design, and eventually, the project was cancelled (Neven and Leeson 2015).

In the Netherlands, social robots are already in use in long-term care homes and are available commercially (Hofstede 2025). In India, although social robots are not widely available at the moment, researchers have investigated people's perceptions of this technology to evaluate its potential use. One study on the perception of assistive robots notes that older people were less convinced than their relatives and healthcare professionals about using a robot in the future (Hegde et al 2024). People with dementia and their caregivers in a mental health institution in Chennai were open to the idea of engaging with a social robot to combat isolation (Natarajan et al 2022). Caregivers had a positive attitude towards using robots in the

future but struggled with the idea of immediate robot use. Natarajan et al (2022: 244) mention that this was due to the "stigma perceived to stem from talking to a robot," but do not discuss in depth what specifically this stigma would be.

Discussion

Socio-technical imaginaries of social robots for older people, and AI, more broadly, differ in India and the Netherlands in terms of the media through which they are promoted and in their content. In India, studies explore these imaginaries within fiction, particularly film, while in the Netherlands, the imaginaries have not been as much fictional as realistic, formed through documentaries and news media. In terms of content, Indian films raise societal and moral concerns, such as replacing human workers, the disintegration of a wide family support network, and ageing alone in the context of international labour migration of adult children.

The discussion of robots replacing human workers is particularly poignant in India, as the skills deemed replaceable by robots are linked to the longer histories in which certain forms of work are devalued, precisely because of their exploitability within imperialist economic structures (Atanasoski and Vora 2019). Care work has historically been delegated to racialised, colonised and gendered workers (Pyle 2006). If robots and other AI-powered technologies are supposed to fix the care crisis, they are envisioned to replace not just any kind of worker, but those who are involved in care: women, especially low- and middle-skilled carers who are often also migrants from formerly colonised countries (Ahlin 2023; Wright 2019). Digital technologies are envisioned as improving healthcare by dividing care tasks into those that can be substituted by technologies and those that cannot be; if this vision materialises, certain "workers, often female migrants, are likely to experience the most pronounced devaluation of their work" (Breuer and Müller 2024). The techno-liberal project of robot development for the purposes of worker replacement is, therefore, far from neutral, but is embedded in—and at the same time obscures—the uneven gendered and racial character of care labour (Atanasoski and Vora 2019).

Finally, socio-technical imaginaries guide and are embedded in social robot design. In the Netherlands, social care robots have been developed for more than a decade and are also being introduced into care settings, while in India, research is exploring people's attitudes and perceptions towards the idea of social robots in care. In both cases, imaginaries of robots and ageing impact people's perceptions about what a robot is and who it could serve. Although people in both countries acknowledge the potential of social robots for care, they find it difficult to imagine themselves as the main users of these technologies. Robots, they seem to say, are not for them, but for some other people, somewhere else, far in the future.

Further Research

Socio-technical imaginaries are key in imagining the desired technological futures and making them a reality. Care crisis due to ageing populations and lack of human resources

is common in many countries, including India and the Netherlands. Just as common is the promise of technology to solve this crisis. However, a close investigation of socio-technical imaginaries, especially those underlying policy and research, reveals that these promises can be questioned. Further research could investigate how socio-technical imaginaries in films and news media, policy and research, described in this contribution, influence the development, implementation, acceptance or rejection of social robots, particularly in India, where the field is just emerging. In the Netherlands, it would be useful to examine how the findings from research on robots are incorporated (or not) in participatory design and policy.

Further research in India could explore in depth the attitudes, perceptions, development, and use cases of social robots in health and long-term care. What are the locally specific views of social robots and the potential risks and ethical issues? Claims such as that the role of robots in elder care is “gradually being accepted by the Indian society” (Deo and Anjankar 2023: 8) require further substantiation through research evidence; the mention of stigma attached to robot interaction also calls for elaboration (Natarajan et al 2022). Moreover, it would be important to investigate the impact of AI, digitalisation and robotics on those Indians who migrate abroad as care workers, and more broadly, how these emerging technologies impact health and long-term care professionals at different levels.

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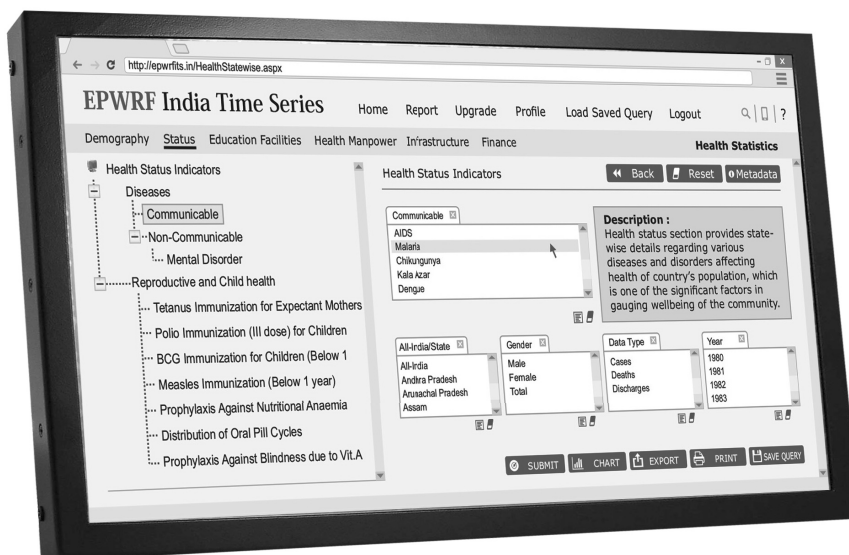
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