
REMOTE ROBOTICS, OR THE DIGITAL RE-EMBODIMENT OF LABOUR

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ABSTRACT

The remote operation of robots in logistics is becoming increasingly prevalent, with robots being deployed across various sectors and operated by workers from a distance. This allows manual labour to be conducted remotely. Despite eliminating the need for physical proximity between the robot and the operator, remote robotics still necessitates human interaction to control the machinery, a process we call re-embodiment. This working arrangement introduces constraints on the communities and territories of remote workers. Rather than deviating from traditional labour practices, remote robotics extends the reach of capital and perpetuates existing patterns of exploitation.

Keywords automation · robotics · telepresence · logistics · circulation · embodiment

1 Introduction

In the 2008 science-fiction movie *Sleep Dealer*, director Alex Rivera depicts a future in which Mexican workers hired by maquiladora facilities in Tijuana operate robots working on construction sites in the United States. In the film's imaginary world, capital can import manual labour without having to deal with the movement of the racialised bodies who have traditionally migrated to take up jobs in construction, farming, care work, and manufacturing. To do so, capital mediates labour through a technological system that includes virtual reality, neuro-digital connectivity, and remotely operated robotics. As futuristic as this may have seemed at the time, remotely operated robotics are now being deployed in rudimentary forms in several areas of logistical labour, extending the reach of digitally mediated remote work to realms such as retail, trucking, warehousing, and last-mile delivery. Remote robotics technology expands the types of labour that can be digitally mediated across space. Unlike historical teleworkers, remote robotics workers perform manual labour in the physical world but do so via prosthetic robot bodies. This form of technologically mediated labour process spatially separates these workers from the effects of their manual labour. Capital thus gains a new means to harvest labour power from global (and local) peripheries, where it is cheaper to buy and easier

to discard. In the process, both the worker's body and the territory it exists within are re-imagined, re-made, and re-signified.

Of course, the use of technology to mediate labour at a distance is not new. In recent years, remote work has become one of the most common forms of labour for many workers. Even a shift to remote manual labour is not completely new: armed conflicts around the globe remind us daily of drones, whose operators can reside thousands of kilometres away from war zones (Tahir, 2017). For years, surgeons have been able to perform operations remotely thanks to robots. Until recently, such kinds of work, decoupling the physical proximity between robot and operator, remained uncommon in everyday life; drones function within the state of exception of war, and surgeons within cordoned medical zones. But things are changing. Since 2021, for instance, UCLA students have been taking selfies with the cuboid Starship delivery robots that bring them lunch, and the city of Los Angeles has set up an office to consider the policies and infrastructural changes needed to smooth out the relationship between these robots and other street inhabitants (Kovacic et al., 2023). This expansion of remote robotics raises the longstanding question of automation and capitalism in a novel way. The possibility of an increasingly autonomous capital is at stake here, but not in a direct or simple manner. Remote robotic work demonstrates that capital cannot be equated with a linear progression towards digitalisation and abstraction from the human. Capital's very real tendency towards the development of autonomous technology encounters obstacles, and its visions of automation remain, at best, partially realised. Remote robotic work does not demonstrate the wholesale automation of labour but rather the complex spatial mediation of labour, in which workers are not merely abstracted from their bodies but reinserted, digitally, into new robotic ones. This suggests that workers' bodies do not only function as barriers to capital. We contend that in the context of remote robotics, embodiment can become a conscious strategy for capital. While seeking to make itself increasingly autonomous from living labour, capital simultaneously returns to the human body to advance the exigencies of accumulation. This involves the prescription of *robotic re-embodiment*: embodiment transformed and sometimes obscured by accruing technological layers. Re-embodiment refers to human labourers remotely operating machinic bodies through a telepresence interface, thus providing the sensory and motor capacities that robots and artificial intelligence still lack.

We explore this phenomenon by analysing the promotional and operational discourse of four companies that are seeking to apply remote robotics in the logistics sector. We situate this emerging category of labour within a broader political economic shift. We contend that the emergence of varied forms of robotic re-embodiment in the logistics sector exemplifies the broad shift in capitalist economies towards an emphasis on rationalising circulation, in the face of stagnation. Moreover, the territories where the machines operate and those where the workers providing labour power reside are also reshaped by the deployment of remote robotics, forcing capital to deal with new frictions and obstacles.

2 Logistics and Labour

If logistics is 'the organisation and coordination of resources to manufacture and distribute global commodities' (Hockenberry et al. 2021: 1), the labour of logistics is then circulation labour; labour which serves to transport commodities to and from the market and thereby facilitate the valorisation of value, forming an essential counterpart to labour in production, which produces commodities (Gough 1972). Without circulation, commodities would not be sold and thus the value they embody would not be realised. Yet, while circulation is necessary to capital, Marx (1993) held that it is perceived by capital as a barrier, insofar as during circulation 'the ability of capital to reproduce itself, and hence to reproduce surplus value, is suspended' (658). Until the value of a commodity is realised, it cannot be reinvested in a new production cycle. Thus, at a structural level, capital has a 'necessary tendency' towards the impossible achievement of '*circulation without circulation time*' (Marx 1993, 659, emphasis original). In other words, circulation must be accelerated.

Facilitating circulation requires the technical mediation – and reconfiguration – of space, time, and bodies to achieve the differential exploitation and displacement of labour on a global scale. Information technology is at the core of this project, as it allows capital to optimise social relations in the service of circulation via the 'annihilation of space by time,' as Marx (1993, 425) put it. Yet, space is only metaphorically annihilated; more accurately, it is reconfigured. The 'logistics space' where commodities circulate is mediated in myriad ways that redefine how it is lived and worked within, including GPS and satellites, managerial software tools,

as well as the capture and analysis of robust streams of data from both workers and commodities (Cowen 2014). Logistical media thus extract value by ‘calibrating’ labour, life, and commodities to optimise the efficiency of supply chain operations (Rossiter 2016), shifting ‘from the direct discipline of labour in enclosed spaces to algorithmic management across multiple spaces’ (Benvegnù et al. 2019, 10). This makes logistics ‘a site of both turbulent conflict and potent possibility’ (Chua et al. 2018, 621), as developments in global flows of commodities, bodies, and data demand new workplaces, new forms of workforce composition, and capital’s access to new territories where worker communities subsist. However, in the process of doing so, the capitalist fantasy of a frictionless logistical space clashes with social, political, and environmental obstacles.

Recent research discerns an increasing emphasis on circulation and the realisation of value, rather than its production, by capital in the 21st century. While such analyses vary in their exact arguments, they are united in the contention that this is because of problems with the generation of value in production. Instead, capital is devoting technology to the acceleration of circulation and the cheapening of its costs. Bernes (2013) contends that the sophistication of logistics ‘indexes the subordination of production to the conditions of circulation.’ Logistics is thus understood as ‘capital’s own project of cognitive mapping’ (Bernes 2013) to keep track of increasingly complex circulation processes. The advancement of what Pfeiffer (2022) calls the ‘distributive forces’ calls for automation; however, the technical capacities for the wholesale automation of circulation do not yet exist. Remote robotics labour is a kind of labour which facilitates the acceleration of circulation. Here, perhaps even more than in production, we can see the contradictions of the capitalist use of machinery and its paradoxical implications for labour. Remote robotics labour is an unstable, loosely defined category, the future of which is uncertain, depending on an array of factors including the continuing sophistication of robotics and AI, the acceptance of remote robots by particular places, as well as the costs of producing and maintaining such technology and obtaining the requisite labour at an acceptable cost.

To better understand remote robotics labour, we analysed a global selection of cases of contemporary logistics companies utilising remotely operated robots in North America, Asia, and Europe. We chose four examples of such companies: Kiwi, Nuro, Starship, and Telexistence, because they have moved beyond ideation and planning and are now in the execution and scaling phases. These companies purvey wheeled robots for last-mile commodity delivery, larger remotely controlled cars and trucks, as well as teleoperated robotic arms for shelf stocking in supermarkets. Two of these companies operate in the USA, and one in the USA, UK and Europe, drawing workers remotely from within the country as well as from South America and Europe, while one operates in Japan and draws workers from the Philippines. These examples serve as case studies, offering insights into the early development of remote robotics within the logistics sector. These examples were selected because they each demonstrate a particular aspect of remote robotics work particularly well. This kind of work is nascent and subject to continual change as the related technology evolves. We do not propose to offer a complete picture of this kind of labour, but only to outline some salient dimensions.

Information for this analysis came from publicly available sources, including company websites, publicly available company-produced documents including safety policies, and the online presence of companies on platforms such as LinkedIn. We placed special emphasis on companies’ marketing materials and job postings to glean insights into the ways in which work in the emerging remote robotics sector is conceptualised. We acknowledge the limitations of this approach, such as potentially outdated sources, marketing-influenced discourses, and a lack of direct engagement with workers. Nonetheless, given the novelty of this research area, we consider this approach as providing an initial glimpse into the field and a call for future empirical research. As noted by scholars grappling with such challenges, critically engaging technological systems through the eclectic collection of data from multiple sources can offer precious information about its social and political dimensions (Seaver, 2017). These forms of ‘technography’ study the material aspects of technology to ‘examine how digital technologies are imagined as participants in everyday life’ (Berg, 2022: 827).

3 Autonomy and Operators

Remote robotics offers a new perspective on capitalism’s structural tendency towards the augmentation and replacement of human labour with machines. As Marxists have long pointed out, automation is driven not by the avarice of individual capitalists, but by the dynamics of competition between firms in the market. Increased labour productivity in one firm compels competitors to introduce similar measures or produce

commodities at sub-par or zero profit, which ultimately inhibits their ability to accumulate capital. In short, automation is an imperative forced upon firms ‘by the very functioning of the capitalist mode of production’ (Ramtin 1991, 101). Despite this, capital is far from achieving anything close to complete autonomy from living labour (Steinhoff 2021). Workers tend to remain ‘in the loop’ to provide guidance for machines with limited capacities (Tubaro et al. 2020). In logistics, such a continuous reliance on labour involves the introduction of new assemblages of humans and machines.

One firm exemplifying this is Starship Technologies, headquartered in San Francisco and operating across around 40 US, UK and EU university campuses, with research and development facilities in Estonia and Finland. Starship’s product is a small, rectangular, white, six-wheeled robot. It is essentially a mobile bucket in which packages – mostly meals – can be delivered at the ‘last mile’ level: from merchant to consumer. Starship describes their service as ‘autonomous delivery’ powered by a combination of GPS data and computer vision algorithms. They describe the robots as driving ‘99% autonomously,’ although the validity of this figure is not supported by data. In a report to the UK Parliament, Starship elaborates that their robots make ‘85% of road and driving crossings without human intervention.’ (United Kingdom Parliament, 2023). It is reasonable to be sceptical of these numbers given the ongoing parade of supposedly autonomous systems being revealed to require more human intervention than they let on; from Amazon’s Just Walk Out retail system relying on Indian workers (Roth 2024) to Presto Automation’s supposedly AI-driven fast food systems being powered by Filipino workers (Sato 2023).

In any case, labour remains essential. On a company blog, a representative writes that ‘in some situations human help is needed. Remote operations enable us to deal with the trickier situations where automation is too risky or technically expensive’ (Kosonen 2020). The lack of full automation means that the technology includes the ability for operators to ‘communicate with the robots in a time-critical manner including getting access to all the sensor data, like the video streams, from the robot’ (Kosonen 2020). Job postings for a ‘Fleet Attendant’ position at Starship describe 10% of the position as ‘assisting robots in unexpected situations across the campus’ and on LinkedIn, employees holding a Fleet Attendant position describe their duties as: ‘overseeing the robots during their autonomous operations,’ ‘remotely operating/guiding the robots safely in certain traffic situations,’ or ‘maintaining navigation and localisation processes.’

Another company tackling last-mile delivery is the California-based Nuro, which operates in the San Francisco Bay Area and Houston, Texas. It uses small delivery robots similar to those of Starship, but is also trialling full-sized vehicles which currently operate with onboard safety operators. Nuro boasts of ‘world-class autonomy’ though it also admits to having ‘safety drivers’ who must ‘remotely monitor a vehicle and take over if required’ (Nuro 2022). These workers are called Command Center Operators and work out of the company’s Mountain View depot. According to a job posting, their tasks include: ‘monitor autonomy performance’ and ‘efficiently handle and address any issues by following proper escalation procedures.’ Escalation procedures refer to the intervention of the operator into the robot’s operation. Operators ‘are able to address issues that come up while the vehicle is driving, parked, or delivering’ and if required, ‘the operators can perform a full wireless command override’ (Nuro 2022).

These cases demonstrate an interesting category of labour whose exact tasks will require empirical study to better grasp. However, the brief outline given here shows how the job roles are discursively constructed as a type of failsafe, overseer, and emergency stand-in for the machine, ready to take over when the AI fails to manoeuvre a robot to safety. Without a doubt, this serves to facilitate the image of an effectively autonomous robot, which serves the public relations needs of these companies. Empirical data on the operator’s role and experience of labour would allow a more fine-grained analysis of whether this category of labour is best understood in comparison to a drone operator or some kind of overseer of robots. What our analysis already shows is that last-mile delivery presents great challenges to full automation, and despite substantial investment, it remains ‘one of the most labour-intensive sections of logistical operations’ (Altenried 2019, 115). This is due to the sheer complexity of urban environments, which, as the technical literature notes, make last-mile delivery an immense ‘computational challenge’ (Chu et al. 2021).

Since the proliferation of personal computers in the 1970s, the increasing organic composition of capital has been marked by proliferating layers of software, as capital becomes increasingly cybernetic. Computers are inherently appealing for capital insofar as they allow machines to be responsive to external data or their own output – harnessing feedback, in cybernetic terms (Ramtin 1991). In this sense, robots driven by artificial

intelligence represent an ideal future for capital: generally-applicable machines that can learn and complete any task (Dyer-Witheford et al. 2019). However, delirious claims of a coming full automation have not been realised. Some sceptics even deride AI and related technologies as ‘fauxtimation’: an overhyped charade in which technological capacities are artificially overstated (Taylor 2018). To adopt a more nuanced perspective, one can refer to historical accounts of the long-durée dream of a ‘factory without people’. Each time the limitations of automation become obvious, human skills must be brought back into the picture, and thus the focus moves back to the specific forms taken by the interaction between labour and machinery, rather than the sheer replacement of workers (Uhl 2022). Attempts to automate last-mile delivery show that, rather than a fully machinic process abstracted from the bodies of labourers, capital seeks to integrate human motor skills and perception into the machine. In this, we see a nascent reconfiguration of labour, capital, and machines in which embodied presence moves back into the picture, but in a technologically mediated form.

4 Re-Embodied Labour

Aneesh Aneesh (2006) proposed the idea of ‘virtual migration’ to contrast ‘embodied migration’ with ‘migration that does not require workers to move in physical space’ (1). He contrasted the headhunting operations of US firms, which select and move tech industry workers from the Global South to the US, with digital outsourcing, in which workers located in India were employed by US firms, such as call centres, without ever leaving India. Aneesh insisted that what he called the ‘liquefaction’ of labour had limits depending on the type of work performed: ‘the embodied migration of labour will perhaps never be replaced by virtual labour flows, as some services can be performed only with the body’ (2006, 68). In other words, for Aneesh, the body presents a barrier to the wholesale ‘remotisation’ of labour, and thus to the continuous revolutionising of capitalist production. However, Aneesh’s is not the only possible understanding of remote labour. The term ‘telepresence’ was coined by computer scientist Marvin Minsky (1980) to refer to remote-controlled instruments which draw on ‘high-quality sensory feedback’ so as to ‘feel and work so much like our own hands that we won’t notice any significant difference’ when using them. In essence, Minsky imagined a combination of virtual reality and remotely controlled robotics. He noted that this presented possibilities for the remotisation of manual labour. Remote robotics labour shows that Aneesh’s theory must be augmented to consider ‘embodied telework’ (Roquet 2020, 55).

In 2020, the Japanese company Telexistence was touting a bipedal humanoid robot known as the Model-T, which they claimed would perform retail shelf stocking via tele-presence operators running a VR rig (Telexistence Inc. 2020). Unsurprisingly, this did not work out as the technology for humanoid robots remains experimental. Bipedal walking alone (not to mention the difficulties of grasping) is an ‘inherently complex [computational problem] utilising hundreds of degrees of freedom coupled with highly nonlinear dynamics’ (Ames 2014, 1115). The Model-T was abandoned, and Telexistence switched focus to a simpler robot: an arm not unlike those familiar in industrial settings since the 1961 deployment of the first industrial robot Unimate, a single articulated limb capable of grasping and moving objects. In 2021, Telexistence debuted the TXScara. TXScara is operated by an AI system called Gordon, which combines computer vision and manipulator operation to determine where stock is low and replenish it. However, ‘when the automatic restocking fails due to unexpected environmental changes, the system shifts from Gordon mode (automatic control mode) to Telexistence mode. The restocking operation can be completed 100% by remotely controlling the robot via the internet’ (Telexistence Inc. 2021). Since 2022, Telexistence has deployed TXScara robots in over 100 stores across Japan. As with last-mile delivery, labour here is cast as a failsafe for when the autonomous robot fails.

The shift from the Model-T to the TXScara underscores a broader lesson in the push toward automation: the confrontation of capital with the inherent limitations of current robotics technology. This can be grasped via the Moravec Paradox, the observation made by roboticist Hans Moravec (1988): ‘it is comparatively easy to make computers exhibit adult-level performance on intelligence tests or playing checkers, and difficult or impossible to give them the skills of a one-year-old when it comes to perception and mobility’ (15). Indeed, while complex analytics of vast quantities of data, far beyond human capacities, can be achieved with relatively cheap hardware today, walking and grasping objects, though much improved since 1988, remain difficult to automate and serve as limits to automation thrown up by the diverse physical natures of manual labour. The failure of the Model-T also shows that the tendency to automate produces new,

complex, and contingent arrangements of labour and machines. This accords with a study of Amazon patents which demonstrate a paradigm of ‘humanly extended automation’ in which workers are positioned as sense organs and intermediaries for machines (Delfanti and Frey 2021). Amazon’s machines require human workers’ flexibility, object recognition, and fine motor coordination. Rather than being replaced, workers are subordinated. Their bodies are converted from obstacles to capital into tools, demonstrating Marx’s idea of workers being reduced to the ‘conscious organs’ of machinery (1993, 548). The remote robotics workers we discuss are employed to extend the function of machines; however, they do so while ‘re-embodied’ in machinic bodies rather than having their biological bodies physically inserted between machines in a warehouse.

By compelling workers to extend digital machinery’s ability to sense the environment or to be re-embodied in a robot at a distance, capital overcomes its technological limits. This allows it to push new forms of accumulation into processes that have proven resistant to total automation. To this end, remote robotics allows the calving off of manual labour from a particular human body and its temporary liquidation, such that it can be inserted into a new, machinic body. Robotic re-embodiment utilises all of the techniques of spatial abstraction made possible by telecommunications to overcome the Moravec paradox. In a sense, workers occupy two spatial locations at once: the job site where the robot is deployed and the space where they operate the telepresence rig. Through remote re-embodiment, capital expands its ability to tap into a global reserve army of workers by deploying their embodied labour power from a distance. This has reverberations not only in the robotic workplace, but also in the territories these workers inhabit.

5 Reaching New Territories

Braverman (1998) described how Taylorism implemented the separation of conception from execution: management would plan the labour process and workers would merely execute it (82). Remote robotics enacts a very different form of separation, based instead on a spatial decoupling within the execution of manual labour: the concrete labour (which produces the commodity; i.e. delivery of a meal) occurs at one place while the expenditure of labour-power (the operation of the robot via a telepresence rig) occurs at another. As capital extends its reach to remote robotics workers in disparate geographies, it is implicated in the territories that support each individual worker. Call centres were once emblematic of remote labour due to the ease of managing work at a distance via simple international phone lines. Similarly, recent sectors such as data work (Miceli & Posada, 2022) and content moderation (Roberts, 2019) have started to rely heavily on the unrestricted international flow of data and money. This expansive reliance on remote labour facilitated by digital platforms requires an interpretation of ‘territory’ that extends beyond the mere physical land where workers are situated. Instead, we adopt the definition articulated by Arturo Escobar, who describes it as ‘the systems of relations whose continuous reenactment recreates the community in question’ (2018). This perspective enriches the multifaceted meanings of ‘territory’ by viewing the term as a socio-political construct (Elden, 2010). A territory emerges from, and is sustained by, a network of social practices engendered by its existence (Painter, 2010). Escobar’s definition is inspired by Latin American narratives of resistance, highlighting the struggle of individuals, communities, and lands across various territories in their quest for autonomy.

Take the example of Kiwibot, another company tackling last-mile delivery challenges. Founded by three Colombians and based in the United States, Kiwibot operates small autonomous delivery robots on several campuses in California. According to Kiwibot’s LinkedIn page, out of the 191 employees listed, only 26, primarily senior management—reside in the United States. Excluding four employees in Argentina, the vast majority of the staff are based in the Colombian cities of Bogotá and Medellín. On its website, Kiwibot advertises an entry-level ‘start-up program’ targeted at Colombians. This program is described as a fixed-term employment opportunity lasting between three and six months, designed to teach young Colombian talent how to successfully implement last-mile delivery solutions while working in a tech startup. The Spanish version of the website lists a job titled ‘Supervisor – Robot Operator.’ This is an hourly-paid contract position, based in Colombia and entirely remote. The description indicates that the primary responsibility is to oversee and, if necessary, operate the assigned robot. Applicants are required to have experience with video games.

By extracting labour from Colombia, Kiwibot aims to transform urban consumption in the global North. But in the process, this novel interaction between capital, machines, and workers also transforms, in multiple ways, the territory where workers reside. Paola Ricaurte's broad understanding of territory as a plural entity comes in handy here. Drawing from feminist and indigenous activism, Ricaurte further contends that 'the body as a living organism and cultural product constitutes our first territory, since it is inscribed in social structures, it operates as a vehicle through which society is built and as an interface between individuals and society' (2023). The emphasis these authors place on bodies, as the primary site of territorial conformation but also exploitation, responds to the violence mainly experienced by women and queer individuals in regimes where the coloniality of power persists. From the perspective of remote robotics, the body emerges as the primary channel for capital to extract value from far-reaching territories.

However, workers do not exist as isolated bodies; they rely on numerous others for their sustenance. Roquet (2020) argues that work involving telepresence entails enclosure: 'technologically advanced countries' can 'extract the physical labour of marginalised populations at home and abroad, while at the same time ensuring these workers remain excluded from a more fully embodied social mobility' (33). Yet the lack of mobility does not mean that these workers do not rely on other sources of social reproduction. A territory provides the labour, often performed by women and marginalised communities (Federici, 2021; Jarrett, 2014), that is fundamental in 'creating or reproducing society as a whole' (Bhattacharya, 2017, 2) including the workforce. Communities, including household members, family, worker organisations, neighbour groups, and larger political structures such as governments, all contribute to this sustenance.

While the role of territories in supporting remote robotic labour remains insufficiently assessed, instances from other fields of transnational digitally mediated labour exchanges are suggestive. For example, Posada (2022) discovered that remote workers labouring in outsourced data production for machine learning in Venezuela rely heavily on the social reproductive labour of family members, colleagues, and neighbours. Since capital seeks to capture remote work in territories characterised by low labour costs and protections, the support provided by these actors is crucial in contexts shaped by economic crises, post-colonial global division of labour, and dwindling government welfare. We can hypothesise that remote robotic workers are part of networks of household members (mainly women) who provide care and domestic work, and neighbours who ensure access to basic resources like water, internet connection, and electricity. As remote robotics extend the reach of capital into new territories, we must confront the renewal and expansion of historical processes of global outsourcing, extractivism, and colonialism. Capital outsources social reproductive labour to communities and the state wherever it operates. Its expanded reach through remote robotics and other forms of digitally-mediated labour implicates the reproduction of workforces well beyond the confines of the political jurisdictions where these companies operate. *Robotic Mediation and the Body*

Uber sold off its autonomous vehicle (AV) division in late 2020, signalling to many that the self-driving car was still not technically feasible. AVs remain out of reach for reasons described by the Moravec paradox: generalised problem solving and perceptual reasoning remain beyond the capacities of today's artificial intelligence technologies (Janai et al. 2020). For these reasons, the re-embodiment of remote workers whose labour is mediated by robots is needed if capital is to continue its tendency to automate. Thus, to the data, capital, and commodities that circulate in Manuel Castells' 'space of flows' (1996), the technology of remote robotics adds manual labour. Yet, robots do not simply free manual labour from the confines of the body. Rather, the tendency towards the autonomisation of capital runs into contradictions and confirms the continuous need for embodied living labour – even if this labour is embodied in silico rather than in the flesh.

Looking at cyberspace in the 2000s, Aneesh said that companies tend to distribute their resources on many machines around the world that can be seamlessly accessed by the worker without knowledge of their exact physical location. With remote robotics labour, the centralisation of command and value capture remains the same, while manual labour is decentralised and kept at the margins. This way, capital aims to do away with the need to deal directly with costly and unruly manual workers, instead exploiting new remote populations while placing the costs of social reproduction away from the point of production. These forms of digital mediation may expand the hyper-connected periphery where labour is located if the costs of such expensive fixed capital become preferable to the direct management of manual labourers. In the process, it creates new forms of power, as well as new types of dependency on the re-embodied workers who operate robots, with their desires, politics, and needs. In sum, remote work is not 'virtual' labour, nor is the form of migration it

engenders 'virtual'. If 1990s cybercultures posited the Web as a space to conceal one's embodied identity, remote robotics confirms that the digitally-mediated body is something that can be captured, but never erased, from the picture. Still, this kind of labour involves an invisibilisation (Arlene Daniels coined this term in 1987 to acknowledge the role of women in reproductive labour) of the bodies who perform robotic labour. Like in Sleep Dealer, they are likely to be found in local and global peripheries, be it a maquiladora in Tijuana, a basement in Los Angeles, or a home in Medellín. As stressed by studies of digital migration, some bodies can be simultaneously 'digitally moved and physically stuck' (Shah 2024, 2). Digital mediation thus obscures the situatedness of the human body, such as its gendered and racialised nature, while the very same technological organisation of labour is used to secure its participation in value production.

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