

The Virtual Production of Everyday Life

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Abstract

This article proposes that Virtual Production (VP) constitutes a significant inflection point in the longer trajectory of Tangible User Interface (TUI) research. Revisiting Hiroshi Ishii's foundational concept of "tangible bits," we argue that VP re-situates embodied expertise within digital space, extending TUI's critique of WIMP-style graphical interfaces into contemporary production and beyond.

The argument is developed through a case study of the UKRI-funded *Virtual Production at Model Scale* (VPaMS) project at Aardman Animations. Through iterative prototyping two experimental tools—the Puppet Sculpt Tool and the Block Out Tool—were designed to integrate mixed-reality affordances into stop-frame animation workflows. These tools demonstrate how spatial interfaces can recontextualize embodied craft knowledge without displacing the material practices central to Aardman's animation ethos. We take this hybrid physical-digital workflow as a platform to think about how virtual production and TUI assemblages might arise beyond film-making contexts.

Moving beyond the case study, the article adopts a dialogic format to explore broader implications of VP's convergence with TUI. It examines how advances in real-time rendering, VR/AR hardware, and game engine infrastructures are reshaping expectations around spatial interfaces, and considers how VP practices prefigure emerging paradigms of "spatial computing." We introduce the concept of "the virtual production of everyday life" to describe the potential diffusion of VP-style embodied computational interfaces into domestic and professional contexts. This diffusion carries a dual promise: lowering barriers to sophisticated computation through spatially intuitive interfaces, while simultaneously risking the normalization of embodied interaction according to technical defaults.

Ultimately, the article situates VP within a longer history of human-computer relations, arguing that its capacity to reimagine how physical expertise, craft, and phenomenological experience can be integrated into increasingly pervasive computational infrastructure, produces new forms of embodied practice which in turn constitute evolving forms of the everyday.

1: Introduction

The following discussion is premised on the notion that Virtual Production (VP: the cluster of production practices that combine physical activity and real-time computation) is a significant inflection point in the larger history and trajectory of Tangible User Interfaces (TUI). TUI is an area of Human-Computer Interaction research developed in response to the physical and material constrictions of WIMP-style computation (WIMP: Window Icon Menu Pointer). As Hiroshi Ishii of the Tangible Media Group (TMG) pointed out nearly thirty years ago:

GUIs [GUI: Graphical User Interface] fall short of embracing the richness of human senses and skills people have developed through a lifetime of interaction with the physical world. Our attempt is to change ‘painted bits’ into ‘tangible bits’ by taking advantage of multiple senses and the multimodality of human interactions with the real world. We believe the use of graspable objects and ambient media will lead us to a much richer multi-sensory experience of digital information. (Ishi and Ulmer, 1997)

Several of the heterogenous practices now bracketed within the concept of virtual production entail the re-situation of physical activity within digital space. This process of recontextualization produces an increasingly multi-sensory experience of digital information and the use of physical objects to drive digital data widens the modalities (and the range of human senses and skills) undergoing a form of softwarization (a trend particularly acute in the creative industries: cf., Lesage & Terren).

But more than just a softwarization of certain aspects of media production, a perspective on the relation between virtual production and Tangible UI allows for two specific points of investigation. First, it implies a focus within Virtual Production research *not* on the aesthetics of final pixel or pipeline efficiencies, but on the bodies of the practitioners operating within these production contexts. Secondly, it allows a re-framing of virtual production *not* as a culminating moment in the convergence of computational, gaming and production technologies, but as a stepping stone in a longer story, the horizon of which is the integration of computational media within the praxis of embodiment. Taking these things together - embodiment within media production and the ubiquity of media technologies beyond production contexts - allows us to point to the possibility of what we’re calling “the virtual production of everyday life.” The allusion to the theoretical

lineage of Henry Lefebvre and Kirstin Ross is not accidental: “the virtual production of everyday life” points the ongoing instrumentalization of routine experience (everydayness), by the cluster of computational practices currently prevalent within “virtual production.” For Lefebvre the “everyday” was a critical concept useful for analysing consumerism: “the everyday is a product, the most general of products in an era where production engenders consumption.” (1987,9) For Ross it is potentially a zone for radical practice (2015). Thinking about the “virtual production of everyday life” is an invitation to consider – by turns critically and speculatively, as the following conversation will bear out - the role of emerging forms of human-centred, spatial computing in the production of everyday embodied experience.

This analysis is timely, given the increasing ubiquity (everydayness) of virtual production techniques and gesture-based computational interfaces across an increasing swathe of screen and moving image production. Taking the technical particulars of virtual production as symptomatic of a broader evolution in human-computer relations, and in particular, the role of human gestures and embodied expertise in the shadow of the digital interface, gives us the opportunity to both re-examine specific virtual production innovations in the light of the long-history of tangible UI, and to speculate on how the past several years of virtual production innovation might feed forward into the media paradigm currently being scoped under the title of ‘spatial computing’ (Xu et al, 2024).

We will do this, first, via a discussion of some experimental tools developed to integrate the affordances of virtual production workflows into the stop-frame animation powerhouse, Aardman Animations. Second, via a dialogue seeking to tease out the possible implications of these innovative toolsets. Ultimately, the concept of ‘the virtual production of everyday life’ is an attempt to think through the two-edged promise of spatial computing; to lower the barriers for entry to sophisticated computation by constructing a spatial interface commensurate to embodied intuition, and to conform embodiment to the preconditions/defaults of the technical interface. At base we’re asking: what do the development of Tangible UI and Virtual Production reveal about the greater integration of physical-digital interfaces in everyday life?

The current collaboration is founded on a common investment in how humans are situated (and perhaps more crucially, *feel themselves to be* situated) within media infrastructures,

virtual realities and environments of computation. Given our respective backgrounds, this piece will proceed with an initial description of the Virtual Production at Model Scale (VPaMS) project exploring the utility of Virtual Production toolkits within stop-frame animation pipelines at Aardman Animations. Following this, and picking up threads within the Aardman project pointing towards the horizon of the virtual production of everyday life, the piece will adopt a dialogue format to better spotlight our respective interests in the cultural and theoretical implications of emerging technologies (TL) and the challenges and opportunities surfaced through the process of developing the technologies and applications themselves (JL).

2: Aardman Animations: Virtual Production @ Model Scale

As part of the UK Research Institute funded Creative Technology R&D project MyWorld, Aardman Animations launched, in 2024, a sponsored R&D initiative exploring the utility of Virtual Production processes within its own animation pipeline. Methodologically, the project consisted of assessing the immediate utility of off-the-shelf virtual production toolkits and their associated orthodoxies; developing a series of experimental tools targeting high-friction, resource-intensive parts of the development and production process; stage a sequence of sandbox demos with stakeholders such as animators and directors, to refine and validate these tools, and scope possible avenues of implementation (for a deep dive into the project cf. Livingstone, 2025).

To anyone with a passing familiarity of Aardman Animations and/or Virtual Production processes, the challenges inherent in the project are manifold. Virtual production is built on real-time rendering (where frames/images refresh up to 60 times a second), stop-frame typically proceeds at less than a dozen frames a day. What is more, Aardman's iconic aesthetic depends on the tactility of the models on screen, the ineffable artefacts of a process in which materials are physically manipulated between every frame to draw out a character-rich performance (Wells, 1998, p.59). That said, as a studio Aardman has never been shy of technology (*Chicken Run* (2000) was the first UK feature to utilise a digital intermediate from start to finish). Over the last twenty years, the studio's output has consistently scaled up, not only in the base metric of minutes of animation produced but, in the ambition,

and complexity of those minutes which feature more and more characters, settings and effects (all of which depends on extensive post-production processes, cf. Wood 2019).

The challenge, then, for any implementation of virtual production workflows and technologies was to simultaneously mitigate points of material friction within the pipeline, whilst enshrining the material particulars of the animation process that make Aardman's animation so unique. Two tools that are of particular relevance to this conversation: Puppet Sculpt Tool and the Block Out Tool. In brief, the Puppet Sculpt tool was designed to optimise the cycle of puppet design, review, iteration and sign-off, by providing additional spatial context to the process of inspecting a digital 3D model created in 3D sculpting software ZBrush..



FIGURE 1: An Aardman creative using the Puppet Sculpt Tool to review a line-up of virtually sculpted puppets.

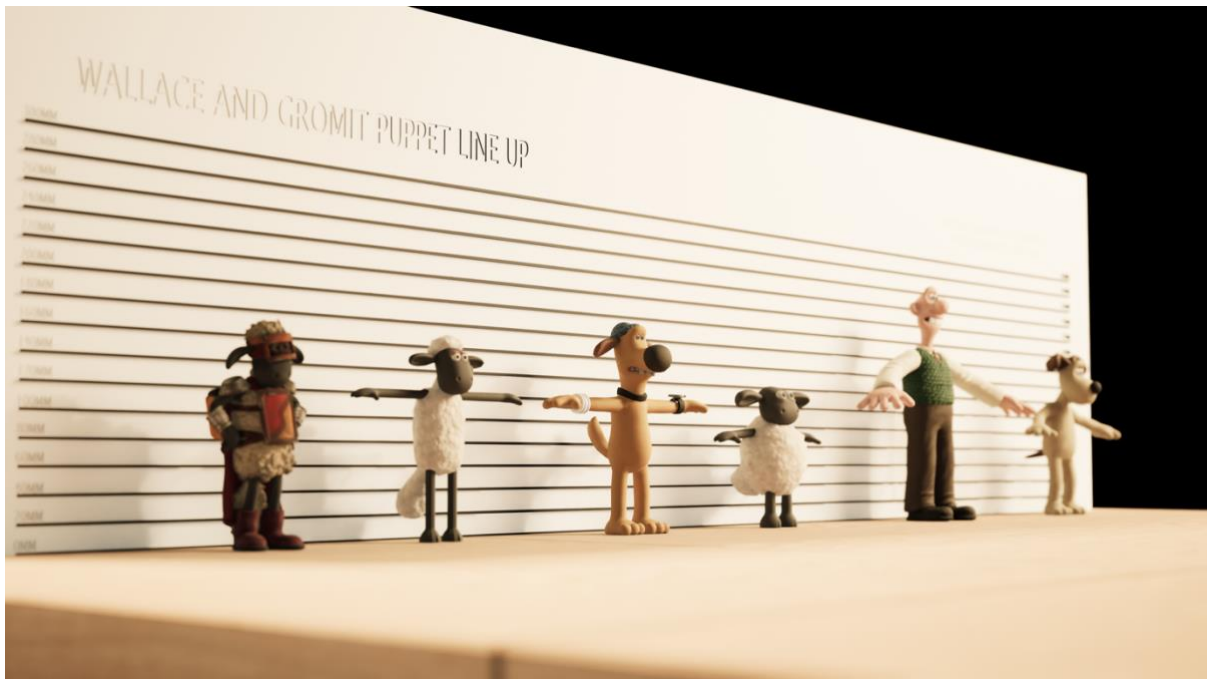


FIGURE 2: The line up of digital sculptures.

Translating pre-visualisation processes to a spatial context proved particularly beneficial to Aardman pre-production departments, as the process of ratifying puppet designs heavily depends on finessing their scalar relations to the physical spaces of production and the proportions of assets that have already been built. The mixed reality interface accelerated iteration cycles by placing digital iterations of characters into the physical spaces of production and enabling a fully embodied and spatialised inspection process. Moreover, when the team incorporated a scaling and zooming tool into the interface (because up-close inspection is inhibited by VR interocular distances), a new affordance emerged. Namely the creative stakeholders would be able to play with the scale of the assets under review, in the context of already fabricated puppets and sets, thereby allowing them to ‘find’ appropriate scales without physical iterations. The application therefore went from being a pre-viz tool to active in the design process.

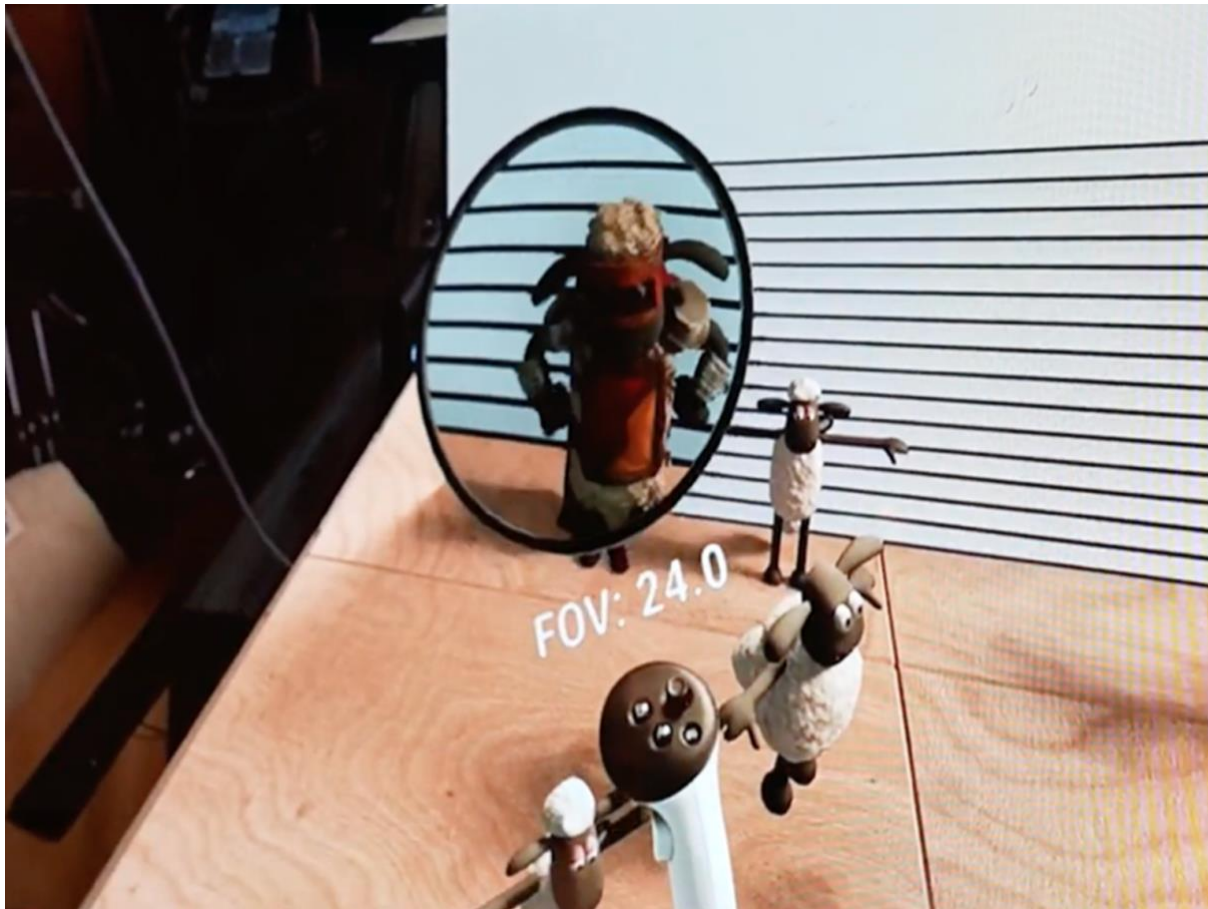


FIGURE 3: The “Zoom” functionality was embodied within a virtual magnifying glass that users could intuitively understand immediately.

The same evolution from pre-viz interface to environment for creative decision making can be seen in the Block Out Tool. It was initially scoped to speed up the translation of storyboards (static shot descriptions) into animatics (rough edits finessing pace and timing). It did so by scanning white-card models (cardboard maquettes of sets to be built), scaling the models up to production size, superimposing them on physical spaces within Aardman’s studio, and using these rough environments as spatial guides for the blocking and timing of action.

GLB FILE 1: Scale whitecard models could be 3D scanned and then scaled up to ‘puppet scale’ in the virtual sandbox.

However, through the sandbox process, the utility of the tool rapidly developed, with the stakeholders exploring how this early-stage spatial context allowed them to engage in key creative processes that usually relied on the physical presence of sets and models. The stakeholders were able to not only translate the storyboards into animatics, in an accelerated way, but had the freedom to diverge from the storyboard shot list and find new ways of framing and staging action, confident that the spatial context provided by the mixed reality interface clearly reflected the physical realities of production. Eve Bolotova, R&D Lead, summarised: ‘we just blocked out a whole sequence with the set that was not there, with puppets which are not there... save money, save time, save space.’



FIGURE 4: An animator moving a virtual puppet using one of the Block Out Tool's physical props.

Aardman animation is, at its most essential, a material interaction: ‘You’re in contact with the puppet every single frame.’ (Nick Park on Corridor Crew, 2025) This interaction

cannot be digitised. Key to the success of both the Puppet Sculpt Tool and the Block Out Tool is the mediation within the interface, not only between physical action and digital data, but the conditions of physical expertise and the functionality of the tool. The tools do not seek to re-configure embodied interactions with production assets. In fact, the opposite. They re-contextualise embodied expertise within digital space, to feed forward information pertaining to the material process of animating by hand. Making the embodied skills, gestures and practices particular to stop-frame animation operative in digital space doesn't generate a digitised version of stop-motion animation, but it does make more time, space and money available for the non-digital practice of animation that can't be replicated.



VIDEO 1: An example of an animatic created using the Block Out Tool.

The case study suggests that one extension of virtual production will proceed along these lines, wherein tangible interfaces that use physical props to drive digital data will, generate a richer experience of digital information. But it is also the case, inversely: the incorporation of embodied practices into computation processing – via ambient sensing and tangible interfaces – will enrich the digital information produced, improving the efficacy of digital rehearsals, XR training simulations and the tailoring of spatial computing interfaces to the physical range of individual users. A mutually enriching iteration cycle

between physical and digital environments, as manifest by the Aardman virtual production tools, points the way to a deeper imbrication of computation and embodiment, a horizon for both actually existing TUI and VP as well as speculative concepts such as the “virtual production of everyday life.” If the craft expertise of Aardman animators can be captured and translated into an efficiency in a hybrid Virtual Production stop-frame pipeline, what other forms of gesture and embodiment might be incorporated into the computational interfaces of the everyday.

3: Dialogue

Tom Livingstone: We’ve already established that Tangible UI and Virtual Production are interestingly intertwined. But from the perspective of a developer, is there more to be said about the present moment of technical and cultural co-evolution? Virtual Production depends on the affordances of real-time rendering: how has the development of game engine technologies also impacted TUI?

Jonah Ling: The earliest examples of TUI relied on physical props being moved by a human operator, consequently being limited by the inalterability of said props. In TMG’s Tangible Geospace project, users could move buildings around on a map to experiment with urban layout; as soon as you want to add a new building you either have to use an old prop whose form won’t match the new building, or else manufacture a whole new object. Many early interfaces got around this by using generic props combined with a screen to display variable data.

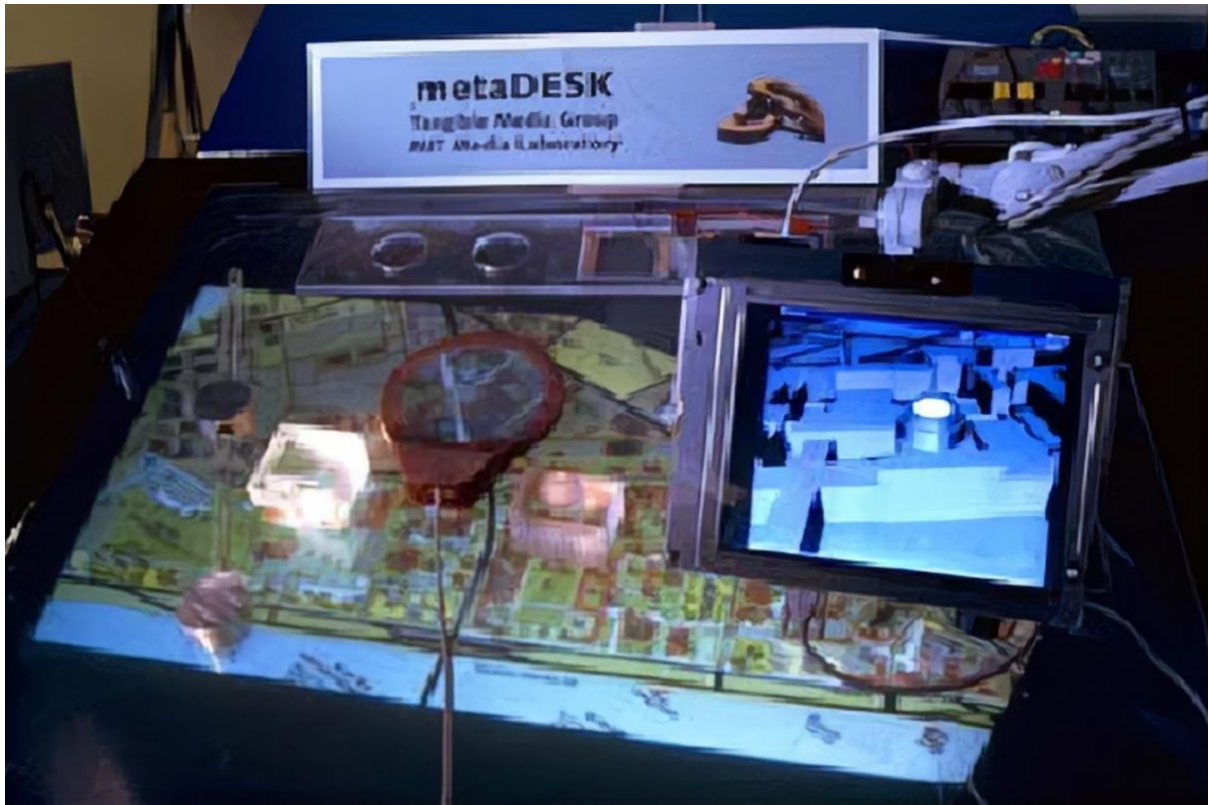
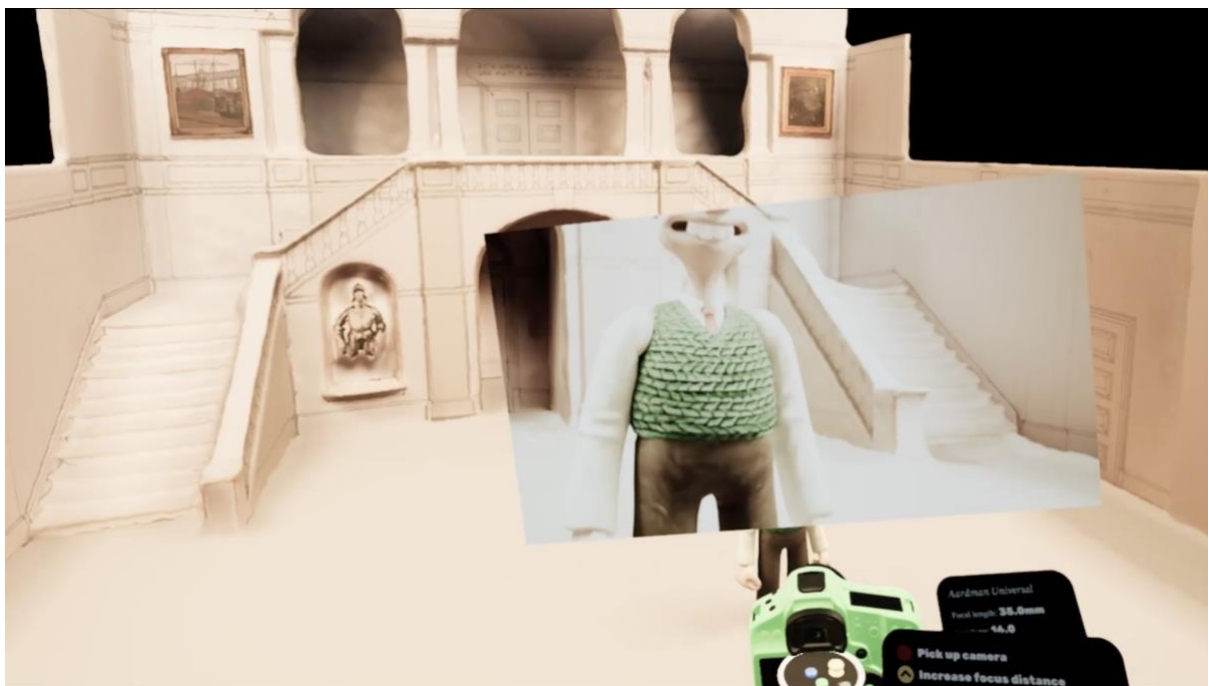


FIGURE 5: TMG's Tangible Geospace application running on their metaDESK platform, a computer that “integrates multiple 2D and 3D graphic displays with an assortment of physical objects and instruments.” (metaDESK - Tangible Media Group, Ulmer & Ishii 1998)

It's therefore not surprising that one of, if not *the*, only successful commercialisation of TUI to date is in the screen-based media industry. Current VP practices consist of very few props (a virtual camera or some mo-capped actors) that require no physical adaptation. When the environment of a virtual set or the avatar of a character needs to change, these are reflected solely on the LED wall or in the virtual camera's screen – no changes to the physical props required.

The irony, however, is that the same game engine technology that has allowed VP to advance has also progressed VR technology to the point where we can have digital twins of objects morph and adapt in real time. This means that we can now replace inalterable physical props with flexible digital ones that can change as we interact with them. This is what allowed us to develop Aardman's Puppet Sculpt Tool where users could scale puppets and even change poses in VR whilst holding the same unchanging physical VR controller.

It will be interesting to see whether VP develops interfaces in the future that require objects to change in real-time. VR headsets would allow camera operators to work in full 3D worlds, not just relying on the small screen attached to their virtual camera to give them context. Instead of environment artists constructing virtual film locations on traditional 2D screens, set dressers could physically move props around and paint custom assets in the digital world. SFX artists could then rig virtual pyrotechnics that can react in real-time to the virtual world and mo-capped actors, the actors themselves performing in this immersive digital environment rather than seeing the warehouse, spandex and reflective balls actually surrounding them!



VIDEO 2: The Blockout Tool gave animators and DoPs context when placing virtual cameras in the world, also allowing them to get an idea of how a real camera would fit on the physical set

TL: Initial experiments with Tangible UI grew out of a frustration with the limitations of WIMP-style computation, and a suspicion that this interface was diminishing the phenomenological possibilities (for want of a better expression) of interacting with digital data. The Aardman project had its biggest impact when the frictions inherent to interfaces with steep learning curves were reduced, and people were able to “pick up and play” with

the tools. Is this an indicator that non-tangible interfaces are still falling short of phenomenological expectations, and is this drive to overcome the limitations of established interfaces still a relevant motivating factor in Tangible UI development?

JL: Aardman's VPaaS project was born from the realisation that software simulating three dimensions is tricky to translate into a 2D interface. Whereas most 3D modelling packages employ a 'gizmo' widget to allow users to transform digital objects, Aardman's Block Out Tool let animators simply pick up physical props to move virtual puppets. The incredible thing here is that animators can interact with the virtual world themselves through Block Out's TUI; usually they would need to liaise with a pre-vis artist who is trained in the software. This way, animators could take their skills in moving puppets and directly apply it to the virtual world with no onboarding. In fact, there was a comical moment where one of the animators kept ducking out the way after moving the puppet each frame because the experience was so similar to being on a physical set! The reality, of course, was that their hands could not be seen by the virtual camera.



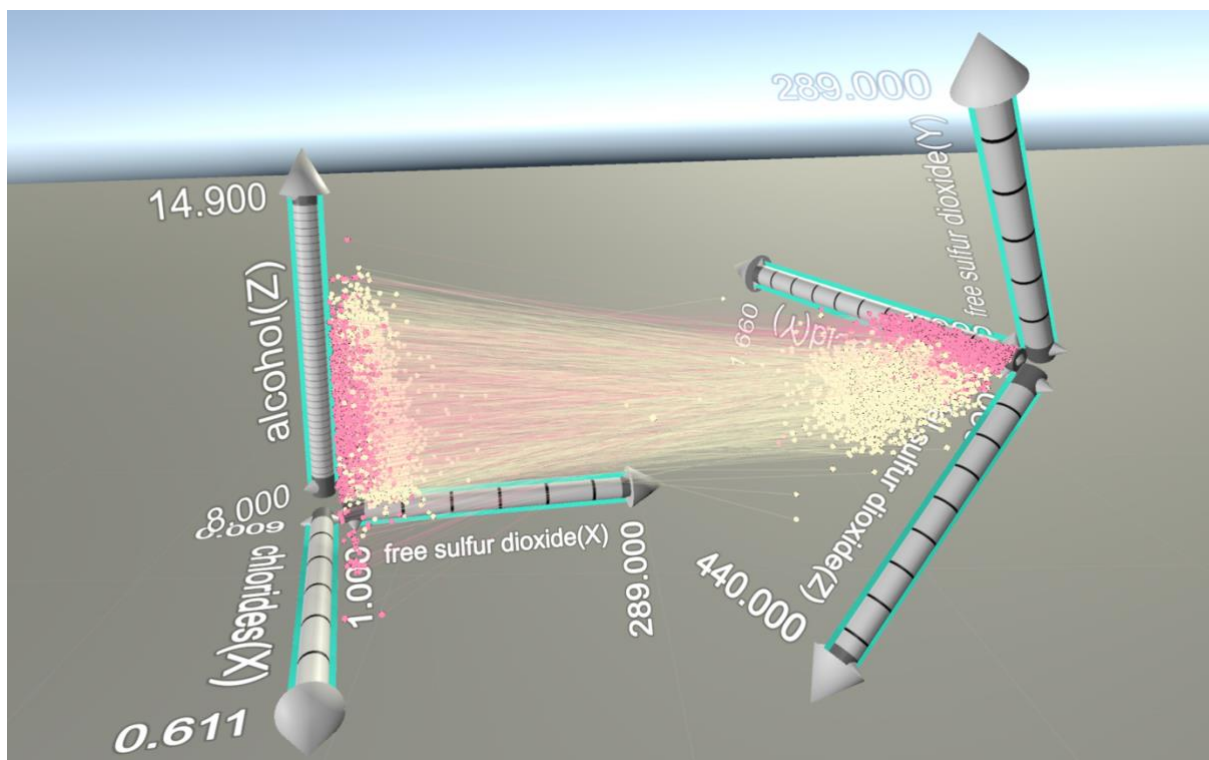
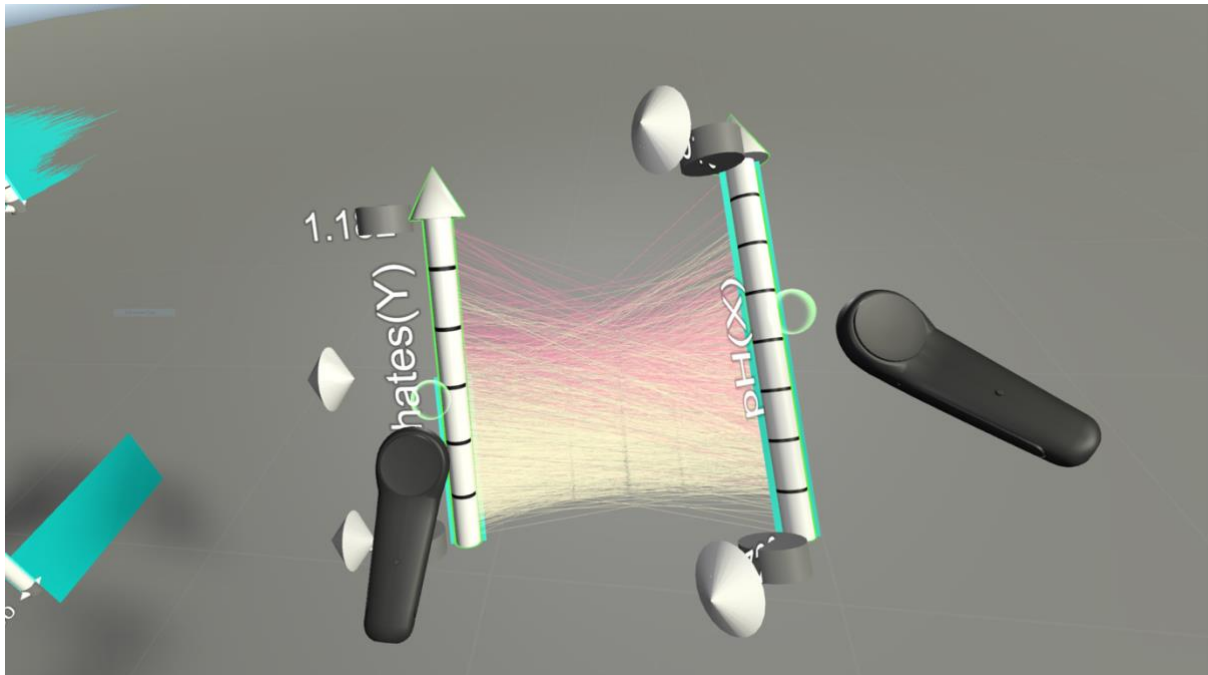
VIDEO 3: Powered by infrared tracking technology, the puppets' movements could be translated into the virtual world.



FIGURE 6: Moving Wallace around on set – no need to duck out of the way.

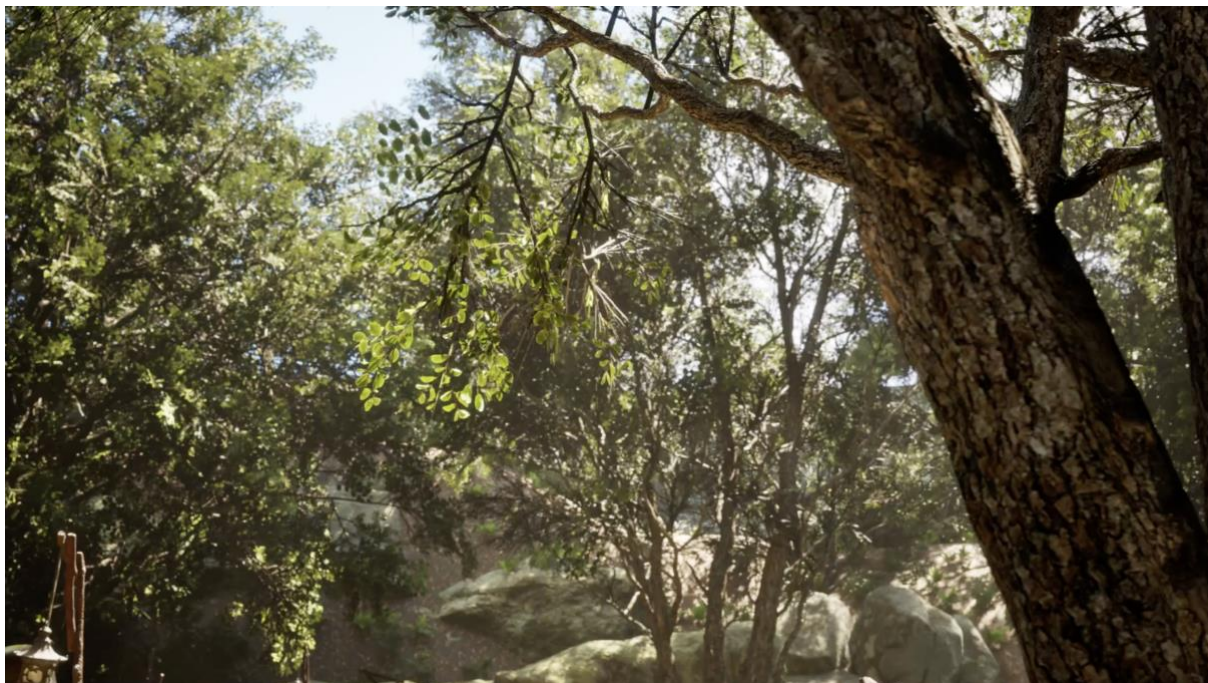
Moving objects around in a 3D world seems to be the main application of TUI so far, VP not being an exception. VPaaS started growing beyond this with tools like scaling puppets or changing their poses, as well as procedural asset tools. Again, all of this is highly achievable using traditional GUI, but the drive for VPaaS was to see if an intuitive TUI could allow creatives to interact directly with the virtual world. However, the real benefit we discovered from this unmediated interface was that it facilitated serendipitous explorations, such as experimenting with new camera angles and lenses much quicker than in traditional pre-vis. I believe that this will become the real motivation for developing future TUIs, and indeed this is already being explored in other fields.

One of the most promising seems to be data visualisation and manipulation. Viewing data in 3D isn't a new idea, but projects like ImAxes have started imagining what interacting with data in three dimensions could look like. They found that being able to grab an “embodied data axis” and combine it with others to assess correlations compelled novel ways of exploring multivariate datasets (Cordeil et al, 2017).



FIGURES 7 & 8: “ImAxes is an immersive multi-variate visualisation tool which uses an embodied axis metaphor to allow users to quickly and intuitively construct complex visualisations.” (Dwyer et al. 2020)

My master's project, *Spacious* (Ling, 2024), played with this idea by re-embodiment data in different objects, particularly natural ones like trees. Said virtual trees could be linked to some abstract data source, like metrics for an e-commerce website. The health of the tree could react to sales revenue, the wind through the branches denoting online traffic, and the loudness and tone of bird song mirroring the amount and rating of reviews being left on products. If branches of the tree were mapped to different pages of the website, then not only would this allow you to see which areas were performing best, but embodied props like a chainsaw or watering can could be used to prune or boost specific products.



VIDEO 4: In *Spacious*, properties like a tree's health or the wind speed can be controlled by abstract data, turning the whole world into a data visualisation environment.

Coding is another area that could see benefits from spatial interfaces. Node-based programming is becoming increasingly popular (for example, the Unreal Engine), and the concept has even been recreated physically by Microsoft to allow those who are visually impaired to code. *Spacious* explored a similar idea through its 3D node-based language called *Rhythm*. Users could drag wires between virtual objects in VR as a way of creating logic, the beauty being that these objects embodied their functions within them making for literal object-oriented programming.



FIGURE 9: With Project Torino, Microsoft creates a physical programming language inclusive of visually impaired children.



VIDEO 5: In Spacious, users can drag wires between objects to create logic, in this case a button that can clone other objects in the virtual world.

A boolean variable can simply be a switch, or a variable update function a metronome. When paired with more complex objects, like the virtual trees mentioned above, even users unfamiliar with traditional coding could start to create bespoke systems due to the

familiarity of the objects' metaphors, like how Minecraft's intuitive redstone logic system has been used to create endless contraptions by gamers of all skill levels.

This brings us to a final point: video games will likely continue to drive TUI forward in the same way they have furthered the VP industry. Like the badges and leaderboards of the gamification trend, as people become acquainted with spatial interfaces in videogames, we could see them slowly bleed into our productivity software.

TL: Speaking of the expectations people have around what computation should look like, the popular vision of future technology is often struck by sci-fi films *via* the use of VFX technologies, and there is a well-documented bi-directional influence between futuristic/fictional user interfaces (FUIs) and real world interaction design (e.g. Shedroff & Noessel, 2012). Films like *Minority Report* used digital compositing – the layering together of 2D elements – to imagine a fully immersive computational environment that looks relatively plausible in today's world. Virtual Production uses spatially embedded computational practices to imagine hyper-modularised, interactive digital environments, which users interact with intuitively. Just as *Minority Report* “diegetically prototyped” (Kirby, 2010) a futuristic gestural interface with the tools available in 2002, Virtual Production techniques – across shows like *The Mandalorian* (2020-) – are often used to depict/prototype speculative interfaces. As someone thinking about Tangible interfaces in this context, what is being normalized/rendered dominant in this production workflow and the tropes that it produces? What can VP practices and VP outputs tell us about future interfaces?

JL: We've just talked about how VP is currently only taking advantage of TUI to move virtual objects around, the benefit being that you get more human outcomes. This suggests that the next successful spatial interfaces will be in other areas where human movement has some inherent value in the virtual output.

As motion capture technology becomes more precise, we could see spatial interfaces being used for digital modelling and sculpting or simply enabling finer controls on virtual tools in general. The insufficiency of modern tracking systems is one reason why VP still relies on touchscreens to control virtual cameras, or why VR controllers are still used for many immersive videogames. There is of course something nice about having a tactile surface to touch or hold but, like in TMG's Tangible Geospace project, using unalterable physical

objects constrains your virtual possibilities. Leaving tangible props behind would make way for more adaptable and portable systems, allowing VP to inhabit not just dedicated multi-million-pound studios, but everywhere from mountain top film locations to operation theatres to even the everyday person's home.

Consumer AR headsets like the Meta Quest 3 and Apple Vision Pro are racing to make this a reality, yet their 'spatial' interfaces continue to consist of floating 'minority report-esque' windows. A natural progression, in line with the advances made in VP, would be the translation to embodied objects and spaces. Rather than interacting with a computer through the narrow frustrum of a screen, you could have a virtual writing desk complete with virtual pen and paper to send emails or write reports; a dedicated virtual studio with sculpting and welding tools in which to 3D model; or perhaps a market place you can browse before placing items in your virtual shopping basket. Put poetically, this could be the beginnings of 'the virtual production of everyday life.'



FIGURE 10: A virtual artist studio for digital modelling—much more inspiring than the grey void that most 3D modelling software greets you with (Ling, 2024)!

TL: Given the confluence of virtual production technologies and Tangible UI, as well as the accelerating adoption of smart-objects creating a form of ambient/domestic virtual production, what obstacles or opportunities do you see to an “everyday” implementation of VP-style computational interfaces analogous to the digital twin workflows in design?

JL: The most superficial obstacle is the technical one, like the need for more sensitive tracking technology that was mentioned above. But beyond that, a more inherent issue seems to be finding problem sets that benefit from TUI, as evidenced by the scarcity of industries like VP. The brief vision I shared at the end of my previous response reimagines some everyday tasks with TUI, yet realistically many of them will likely be less efficient when compared to using a traditional 2D screen. In these cases, it therefore becomes essential that some anthropomorphic value is gained. Justifying this was a challenge we faced at Aardman; our conviction was that the VP workflow would produce more creative outcomes, but this is very difficult to objectively defend.

Another motivation, however, is increased wellbeing. As early as 1995, Weiser and Brown envisioned computer interfaces that could live in our ‘periphery’ rather than always requiring our full attention. Dubbed ‘calm technology’, spatial interfaces could help us reduce overload by allowing us to place objects either in focus or off to the side, giving users the freedom to orchestrate a virtual landscape that matches their priorities (Weiser, 1997).



FIGURE 11: If your computer was your home, then different apps could be different rooms

or spaces, allowing a spatial compartmentalisation between work and recreation (Ling, 2024).

Computers were born from a desire to automate and optimise our lives, and it is this that has shaped the consumer technology in both the everyday home and VP studio. The virtual production of everyday life will require industries and individuals to choose it for its phenomenological advantages over the unwavering efficiency of modern apps.

TL: Your delineations of the cultural and practical obstacles are very useful: they indicate a tension at the heart of ‘the virtual production of everyday life.’ This is a tension between two not necessarily compatible concepts: the first is the continued development of domestic technology and the second is an uncritical re-awakening of the priorities of TUI research from thirty years ago.

The Apple Vision Pro marketing and the spatial computing roadmap make it easy to imagine a future of ambient platforms and spatial interfaces that ignores the tension you’re drawing out, perhaps using the sentiments expressed by TMG and the Calm Tech chapter as window dressing for the ongoing platform capture of embodied human experience. That said, you point to a path forward that can meaningfully lean into both the fact that virtual production is enabled by a range of technologies, including consumer-grade tech, and is geared towards relationships with digital tools that promote rather than constrain health and creativity.

Which do you see as occupying the space that we’ve speculatively carved out? Is there a middle ground that would be a good route forward for continued research? Our concept of the “virtual production of everyday life” suggests that our experience of the “everyday” will be in some measure produced by virtual production style computation. But for this to happen, VP will have to expand far beyond the film industry.

JL: Discovering industries that would benefit from TUI seems like a logical way forward, except I fear this may be a fruitless pursuit. The live-action film industry is fairly unique in that it creates a digital output (films) from a physical input (actors, whether they’re mocapped or not). This flow of physical to digital is where TUI excels, yet the majority of fields operate in digital to physical (construction and engineering), digital to digital (knowledge work), or physical to physical (manual labour). Concepts like Spacious’ virtual trees

circumvent this by stealing physical mechanics (the functionality of a tree) and analogising them in the virtual world with abstract data. Whilst it may sound convoluted, the digital sector has been doing this for decades with skeuomorphs such as the ‘desktop’, ‘recycling bin’ and ‘folders’.

Skeuomorphs rely on the assumption that objects in the physical world are intuitive to understand and hijack that to reduce onboarding in software. Similarly, TUI presupposes that we are competent at physical interactions, and that those with learned craft-based skills can transfer these to a digital twin. The danger is that in the digital age physical crafts are being lost, and so TUIs may stop being intuitive. Like how few Gen Zs would recognise the floppy disk in the ubiquitous save icon, the origin of the virtual camera may one day be lost to history (I remember googling what filmbacks and sensor sizes were when I started working at Aardman).

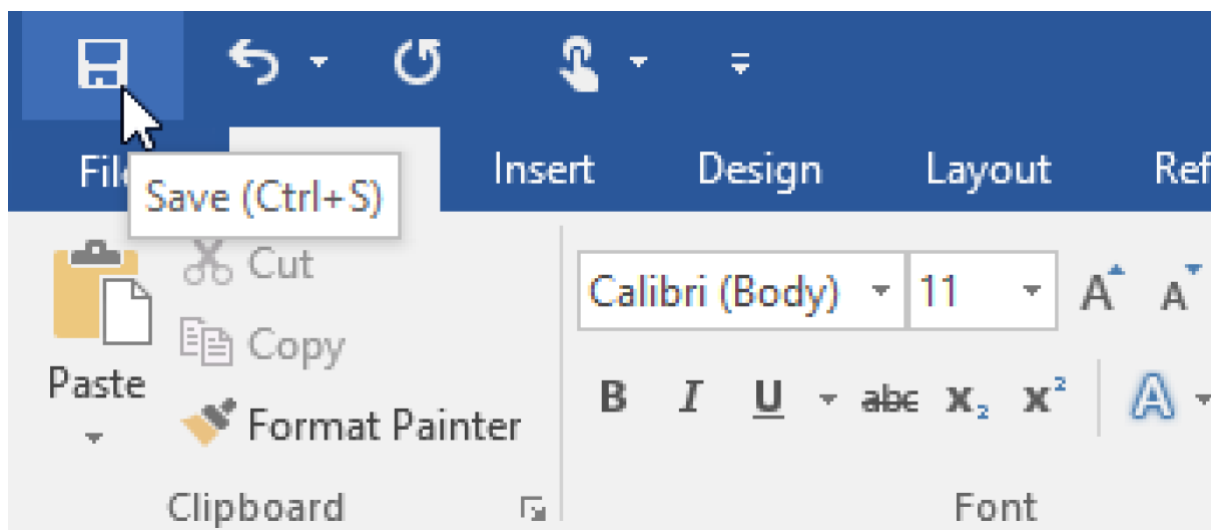


FIGURE 12: The ubiquitous save icon is modelled after a floppy disk and is still used to this day even if many modern users would not know what it is a skeuomorph of.

Yet this highlights an important point: to operate a virtual camera you don't need to become familiar with physical cameras first. Instead, VP workflows are now a craft in and of themselves, suggesting that other industries could still develop successful TUIs even if they have no physical craft to mirror. The pressure, therefore, is really on each sector to innovate within their specific context as Aardman did. If consumer technology is good enough to be found in the VP studio, then it will suffice to begin building the first

interfaces of the virtual production of everyday life; all it needs is for a few more people like Aardman to wonder whether the digital world can become a bit more human.

There may be an argument that the tension within ‘the virtual production of everyday life’ is not merely a technological, financial or even social one. Henri Lefebvre critiqued the belief that leisure activities needed to provide distraction from the mundaneness of the ‘everyday life,’ instead advocating for an ‘everyday’ that incorporated leisure into its totality. According to him, improving ‘everyday life’ required transformation rather than escapism (Lefebvre, 1991).

Our culture has a growing resentment towards technology, with many seeking to reduce their screen times outside of work (YouGov, 2025). Terms such as ‘enshittification’ and ‘doomscrolling’ speak to a broader trend that labels technology as the enslaving enemy. On the surface, ‘the virtual production of everyday life’ is insensitive to this protest, legislating that tech should become deeply embedded in our surroundings. Yet if this integration of tech is done with the motive to constructively transform our everyday lives, could it offer a challenge to the dominant structures of the everyday? With this in mind, how do you think our dialogue fits into the wider philosophical conversation of ‘everyday life,’ and do intuitive spatial interfaces offer an opportunity for the tech industry to positively shape it?

TL: The “virtual production of everyday life” is useful because it encapsulates both the problem and the opportunity in one phrase. It simultaneously evokes an experience of the everyday that has somehow already been produced by computational assemblages akin to virtual production whilst at the same time insisting – with Lefebvre – that this phenomenon of computerized everydayness can be meaningfully decoded. As we’ve discussed, virtual production as a paradigm for spatial computing is mostly confined to the media industries. However, that’s not to say our analyses are premature. Gesturing towards the horizon of the “virtual production of everyday life” is at the very least an invitation to decode how our experience of the everyday is constituted. This reflection is a necessary ground for thinking about how spatial interfaces can constructively transform the everyday, rather than further productize it. The Aardman case study is also instructive here: those tools were developed within strict parameters, and under the imperative to preserve the physical process of animation later in the workflow. They optimised the overall

workflow by accommodating the highest friction point of the process, the moment when the animator manipulates the clay. Perhaps, rather than being seduced by a future-oriented technical imaginary unlocking new forms of embodied computation, spatial interfaces can positively shape everyday life via a logic that celebrates friction and physical process, even as it identifies efficiencies around it. The way screens and other forms of ambient media intersect with processes of food preparation could be an interesting area of research in this regard.

Conclusion

This article used the development of a set of experimental tools within Aardman Animation's stop-frame studio as a starting point for a wider consideration of the relationship between Tangible User Interfaces (TUI), industry constrained practices of Virtual Production (VP) and the possible proliferation of spatial interfaces in industrial and even domestic contexts. At stake is the persistence of embodied skill-sets associated with craft practices within what the discussion speculatively terms "the virtual production of everyday life." Having weighed up the obstacles to and opportunities for the development of TUI in the contemporary landscape as well as examples of how spatial computing is informing varied production practices the discussion considers the social, technical, industrial and financial pre-conditions of the virtual production of everyday life. In thinking about how the experience of the everyday is produced via human-computer relations, we identify the need to formulate how TUI, spatial interfaces and other evolving forms of embodied computation might positively intersect with everyday life, enshrining rather than instrumentalizing embodied practice.

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