Digital Fashion
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'Digital fashion' is a catch-all term signifying an increasingly diverse range of technologically innovative practices within fashion design, garment technology, and fashion marketing. The field encompasses everything from the customisable clothing worn by user avatars within gaming subcultures to collectable digital versions of luxury couture. Digital fashion blurs the boundaries between the real and the virtual, via the use of increasingly sophisticated augmented reality [AR], virtual reality [VR], and extended reality [XR] technology. The term also refers to new forms of fashion consumption and usership within the latest iteration of the internet, commonly known as Web3. Much, but certainly not all, digital fashion is minted on the blockchain and traded as non-fungible tokens, or NFTs. Web3 is the latest iteration of the internet, built upon the cryptocurrency blockchain, which aspires to be decentralised from corporate or state control. Similarly, digital fashion enthusiasts advocate for a decentralised fashion industry, where creatives no longer depend on the 'big four' Western fashion capitals. In this vein, the Dutch digital fashion collective The Fabricant (discussed below), who self-identify as a 'digital atelier', promise to help 'build a new fashion industry where everybody participates and profits'. Building from this, digital fashion has also become a speculative field of fashion futures, whose questions transcend those normally raised by commercial design.

Yet, for all its radical, decentralising spirit, digital fashion is also a lucrative corporate space, dominated by predatory multinational brands eagerly seeking new markets to monopolise. Currently, digital fashion is one of the fastest growth areas within the creative industries, projected to be worth $4.8bn globally by 2031. There are unprecedented opportunities for new startups to become rapidly successful. Almost on a monthly basis, a new software application, or multi-million-dollar technology, rationalises, accelerates, challenges, or redefines the established practices of the fashion industry. A specialist think tank called The Institute of Digital Fashion was established in 2020. Based in Belgium, The Digital Fashion Group have already launched their own online academy and are developing partnerships with universities to explore future models of digital fashion education. The most heralded success story in digital fashion is the digital footwear company RTFKT [pronounced 'artefact']. The company was purchased by Nike, within two years of startup, for an undisclosed sum rumoured to exceed $1bn. The success of RTFKT and The Fabricant has inspired many copycat projects and many predatory investors. The digital fashion sector currently resembles the silicon valley boom of the 1970s and 80s. Indeed, the success of the digital fashion sector is partially built upon the NFT boom of 2021, where .jpegs made digital artists like Beeple sold for millions of dollars. Increasingly, digital fashion is where the bright young things of fashion design join forces with luxury brands, venture capitalists, cryptocurrency experts, coders, and occasionally cyber-theorists, in a melange which includes techno-utopianism, financial speculation, and conspicuous consumption in equal measure.

Defining Digital Fashion

Digital fashion, then, is a contradictory, experimental space where the latest style trends integrate with futurist ideology, fuelled by the white heat of technology. Nevertheless, early scholars of digital fashion like Daniella Loftus [https://www.thisoutfitdoesnotexist.com/] have tentatively begun preliminary ontological work. Loftus argues that true digital fashion began in 2018 with the formation of The Fabricant. In series of posts on her website, Loftus she also defines a taxonomy of digital fashion with three key areas:

1. **IRL [In Real Life], also called Digital-Physical**. This category refers to physical clothing made or enhanced by cutting edge digital software. IRL digital fashion physically exists and can, in principle, be worn upon human bodies. More generally, the IRL category also describes digital clothing which has a real-world counterpart. Selling collectable NFTs, or 'digital twins', of physical fashion collections has been identified by Macdowell, in a 2022 article for Vogue Business, as a key growth area. One key IRL designer is Iris Van Herpen, who uses 3D printing technology to create magical, otherworldly, haute couture resembling subaquatic, alien lifeforms. In 2019, she released the 'Cellchemy' collection of 3D printed face jewellery which utilised mapping technology, developed in partnership with the Delft University of Technology, to create bespoke masks which contour perfectly around the wearer's face. Speaking of the 'Shift Souls' collection which first featured this jewellery, fashion theorist Anneke Smelik described Van Herpen's work as 'posthuman' fashion. This is

not only because of the transversal connections it suggests between the human and non-human, but also because it 'erases the face, which is so important for the human figure as the index of personal identity'. More pragmatically, designer and academic Holly McQuillan argues that digital design software such as Clo3D suggests a potentially zero-waste future for the real-world fashion industry.

2. **ORL [On Real Life], also called Phygital**. Phygital is a portmanteau term, combining 'physical' and 'digital', which has gained early popularity in both digital fashion and web3. However, it is frequently misused to generally describe any combination of physical and digital elements. Loftus' ORL classification is more precise, referring specifically to digital fashion mapped onto real life bodies using VR/XR/AR technology. RTFKT are a good example of this category. In 2021, they developed the Cyber Sneaker Lens which allowed users to superimpose NFTs of RTFKT trainers onto their feet. This used the same AR technology that SnapChat users employ to add live filter effects to their faces during video messaging. Another good illustration of the commercial potential of phygital fashion is the Magic Mirror [https://www.magicmirror.me/Home/AboutUs]. This innovative technology facilitates the 'virtual try-on' of clothing. It does so by digitally recording the image of people in front of it, allowing clothes to be superimposed over their bodies. Initially developed in 2007, the Magic Mirror has gained technological sophistication in recent years. It is now capable of scanning the user's body shape, auto-sizing customers, and directing them towards perfectly fitted clothing, online or in-store. Phygital Twin, a start-up company founded by Fashion Executive Louise Lang in 2022, argue that phygital fashion could provide an on-demand, real-time solution to surplus fashion in the production chain.

3. **URL (Unreal Life), also called Digital-Only**. This refers to digital clothing designed to be worn only on digital avatars. As Loftus argues, the seeds of URL fashion can be traced right back to the customisable characters in the very earliest computer games in the 1970s. This tradition has now found its apotheosis within the digital fashion 'wearables' of web3 and the metaverse. Louis Vuitton have designed URL fashion for the online multiplayer battle game League of Legends, Balenciaga and Moncler for the online battle game Fortnite, and Gucci and The North Face for AR mobile collecting game Pokémon Go. These games are some of the most played worldwide, representing lucrative markets for big brands. Sportswear companies like Adidas and Nike now sell digital versions of their trainers within the gaming platform Roblox. Indeed, URL fashion gained notoriety with the mainstream media when a URL version of Gucci's Dionysus clutch bag sold on the Roblox platform for 350,000 Robux [$4,115] (Chrimes and Boardman 2023). This figure is more than the real-world counterpart retailed for. Gucci are early sector leaders in luxury URL fashion; their Roblox based retail environment Gucci Town is a pioneering example.

   From the countercultural side of URL fashion, The Fabricant are often cited as creating the first piece of digital-only couture in 2019. This was when they minted and sold the Iridescence Dress for $9,500 USD, even though it existed solely online. Somewhere between ORL and URL, the Iridescence Dress was made in collaboration with videogame and blockchain developer Dapper Labs and the artist Johanna Jaskowska, whose digitised body also modelled the dress. The Iridescence Dress is animated with a Hollywood level of verisimilitude, appearing like it is made from translucent fabric, pulsating with electric energy, and gently flowing in the breeze. Rather than mere fashion, The Fabricant's Creative Director Amber Slooten claimed that the Iridescence Dress was a commentary on the digital evolution of humanity: 'we are no longer bound to physical space. Our bodies are becoming fluid, our money decentralized, new powers are being formed. Slowly we are moving into a non-dual operating system [...] This outfit provides a look into the future'. In this sense, URL has the potential to be the most experimental field of digital fashion. Here, freed from the laws of physics, designers can create seemingly impossible and future-facing fashion designs.

Digital Fashion Users

Loftus suggests that digital fashion users can be separated into three categories: the 'monetiser', the 'flexer', and the 'Gen-Z Creative'. Alongside big brands, the monetisers of digital fashion potentially include film and TV costume departments, magazine editors and stylists, and social media influencers, all of whom can save costs and increase productivity by using digital rather than physical fashion. However, a dystopian tendency of monetisation is already evident in the hyperreal AI

powered virtual influencers which are threatening to take the jobs of their real-world counterparts. An example is Aitana Lopez, who is an entirely fictional, pink haired model, followed by over 200,000 people on social media, and paid over $1,000 a post to promote brands such as hair care company Olaplex and lingerie company Victoria's Secret.

Monetisation will be readily familiar to most URL digital fashion consumers through the tradable in-game collectables, popularised through video games over the last decade Whilst speculating real world money on virtual clothes might seem strange to many, gamers are used to buying in-game expansion packs, trading virtual footballers, Pokémon, and other in-game tokens. 'Play to earn' web3 video games like Axie Infinity have further normalised the financialisation of digital life. Digital fashion is the next phase of this process of monetisation. Ultimately, whilst the price tags might seem high, The same logic that motivates young people to compete over the latest limited-edition streetwear 'drops' or pay excessive prices for exclusive designer labels also fuels speculative financial investments in NFTs and digital fashion. The YouTuber Dan Olsen, aka Folding Ideas, recently released a withering critique of NFT culture in 2022 entitled 'Line Goes Up'. Here, he argues that NFT consumption operates according to the logic of the 'greater fool'. This is a classic market actor theory describing how people readily pay overinflated prices for commodities due to the belief that a 'greater fool' will pay more for them in the future.

Loftus' category of the 'Flexer' will be readily familiar to scholars of all aspects of the fashion system. The 'flexer' relates to the contemporary phenomenon known as 'hypebeast'. Originating amongst designer streetwear consumers, hypebeast is a term, sometimes laudatory but often a pejorative, describing a fashion consumer obsessed with the latest labels. The hypebeast is the twenty-first century equivalent to the nineteenth century flâneur or what fashion philosopher Georg Simmel described as the 'slave to fashion' [modenarren]. For Simmel, the slave to fashion demonstrates the artificiality of fashion. For him, the essence of fashion lies neither in aesthetic nor function but the admiration, even awe, of another consumer subject. One century later, social media platforms like Instagram have exponentially increased the capacity for performative displays of fashionability, or fashion as cultural capital. 'Flex culture' is the twenty-first century online version of the 'conspicuous consumption' identified a century earlier by sociologist Thorstein Veblen in his 1899 book The Theory of the Leisure Class. This competitive individualism has accelerated in the age of social media, which encourages performative displays of 'pecuniary strength' and 'conspicuous waste' through lifestyle posting. Nevertheless, digital fashion potentially allows less wealthy fashion consumers the chance to buy affordable phygital versions of luxury fashion to wear solely on social media.

Loftus' third category of the 'Gen-Z Creative' echoes a growing consensus that Gen-Z has emerged as the core consumer base of digital fashion. As suggested, digital fashion is a logical extension from the lifeworlds of this demographic within gaming and social media. In an important article from 2017, fashion theorist Agnès Rocamora argues that the prevalence of social media among young consumers effects fashion in a number of key ways, which she refers to generally as 'mediatisation'. One obvious effect of mediatisation is that outfits are often chosen for their photogenic, rather than physical or tactile qualities. Also, the ever-expanding time spent by young people on social media normalises the use of digital filters to manipulate user appearances. Identity construction is increasingly digital, augmented, even hyperreal. What the sociologist of fashion Joanne Finkelstein's once called the 'fashioned self' is now the 'mediatised self'. The emergent web3 fashion projects are invariably driven by a young generation of Gen Z creatives who are au fait with internet culture. Noticeably, the technological apparatus which acculturates these Gen-Z digital natives is shaping the direction of the fashion industry. Rather than a creative tool, digital media has now become a paradigm towards which much fashion work is shaped. International Fashion shows now all include digital elements and are frequently designed to be live streamed online. Make-up companies have developed 'photo-ready' cosmetics. In-store retail environments include digitally interactive screens. Ultra-fast fashion companies like SHEIN have abandoned the real-world brick and mortar model for the more rationalised, cost-effective model of online only retail.

Critical and Ethical Debates in Digital Fashion

Because of its futuristic content, digital fashion tends to be surrounded by a techno-utopian discourse, similar to that which followed the advent of the internet in the 1990s. In the earliest days of the internet, enthusiastic supporters predicted that the internet would lead to a borderless global community of transparent communication. This would create an information society where the misdeeds of despots could be immediately exposed, and authoritarian governments held to account. Futurists imagined that the internet would potentially allow society to be wrested back into popular

control. Effectively, this reprises the techno-determinist premise underpinning Marshall McLuhan's famous global village hypothesis, from 1964. Here, McLuhan imagined that communication technology would create a 'seamless web of kinship and interdependence' which connected humanity in an ethical embrace, potentially rendering global conflict redundant. Clearly, in an age of cyber-theft, online trolling, catfishing, the dark web, and satellite powered drone warfare, McLuhan's utopian thesis has not been realised. Nevertheless, many of these techno-utopian ideas are revived within digital fashion.

The Fabricant claim that digital fashion will mean that 'anyone can be a fashion designer'. Certainly, the early days of digital fashion have seen the proliferation of successful brands emerging from cities hitherto peripheral to the fashion industry such as Croatia [Tribute], Amsterdam [The Fabricant], and China [Percy Lau]. However, The Fabricant's claim has a deeper political undercurrent, which is essentially cryptoanarchist. The brand has developed a potentially autonomous platform where user-members can design, mint, and trade their own digital fashion designs, using their native cryptocurrency. In principle, this represents a self-reproducing and self-sustaining fashion ecosystem operating independently of the global fashion capitals, dominant fashion media, or even the financial powers of nation states. The Fabricant operates as a 'decentred autonomous organisation' [DAO] which is an organisational model popular in web3. A DAO is essentially a democratic, cooperative structure of governance which utilises blockchain technology to manage democratic processes like voting and rights. With The Fabricant, as with many other DAOs, voting power is determined by ownership of their native cryptocurrency. Effectively, those with more cryptocurrency have more votes. In principle, this is democratic, though this is increasingly being questioned by scholarship. A study by Liu from 2023 indicated that decision making power within DAOs is often concentrated in the hands of a few large token holders, usually the directors, and that low voter participation and hidden structural hierarchies weaken claims of any underpinning principles of decentralisation. After the enthusiasm for the internet of the 90s, commentators such as Goldsmith and Wu questioned whether the internet could ever achieve its utopian ambitions, primarily because of the power of vested interests such as sovereign governments and multinational corporations. For example, the democratising potential of the internet is always conditioned by access to resources and ownership of electrical infrastructure. Similarly, it is clear that the vested interests of the fashion industry are already monopolising what initially promised to be a decentralised space.

The recent example of Metaverse Fashion Week [MVFW], held in the online metaverse platform Decentraland in March 2022 and March 2023 highlighted many of the ethical, political, and aesthetic problems with digital fashion. The radicality of MVFW is that it represented an autonomous and radically democratic alternative to the elitist industry fashion weeks in London, Paris, New York, and Milan. In principle, anyone with access to the internet could attend this event and purchase digital fashion using Decentraland's native cryptocurrency MANA. However, the glitchy software of the Decentraland platform resulted in a poor user experience for attendees, especially those with inferior hardware or limited web3 knowledge. In comparison to leading gaming platforms like Fortnite and Roblox, and even its exclusive real-life counterparts, MVFW had exceedingly low attendees. These factors gave MVFW an uncanny, alienated feel. Given the anticlimactic character of the event, the press were relatively generous, acknowledging the event's promise whilst highlighting its limitations. Folding Ideas was more sceptical, publishing a video of MVFW's empty promenades and shopping centres. Rather than the future of fashion, Folding Ideas released a video in 2023 comparing it to 'a dead mall'. Nevertheless, the second MVFW, in 2023, included many impressively rendered retail environments from leading fashion houses. The virtual DKNY store was cladded in the brownstone facade resembling their flagship Madison Avenue store. Tommy Hilfiger included an immersive retail environment which connected users, via teleportals, to the brands various web3 retail platforms. Probably the most impressive of all the MVFW23 events of all was an area developed by Hugo Boss. This was built on the Spatial platform, presumably to avoid Decentraland's problematic software. Halfway between a scene from a science fiction movie and a high-end concept store, the space blended fashion marketing with a gamified experience where users were sent on quests to win digital fashion. At the time of writing, there has been no MVFW2024. Proposals for an ambitious Metaverse Fashion Summit, run by the Metaverse Fashion Council following a similar event in 2024, were rejected by the voter members of the Decentraland DAO. Only 1% of members voted in favour of the proposal, though this translated into over 40% of total votes, due to the aforementioned issues with DAO voting powers. Despite this, the proposal was rejected and MVFW faces an uncertain future.

The recent explosion of AI software like Midjourney has already radically transformed the fashion industry. The first AI Fashion Week was held in New York in 2023 and has subsequently spread to Milan The mass-availability of generative AI software is already prompting serious ethical questions about image rights, authorship, and even human creativity. At its best, AI-generated fashion

functions as what design educators Anthony Dunne and Fiona Raby call 'speculative design'. This kind of speculative creative work uses design to ask deeper philosophical questions about the world. An example, albeit unintentional, would be the hyperrealistic AI-generated meme, released in late 2023, which depicted Pope Francis wearing a Balenciaga puffer-jacket. This was created by a 31-year-old construction worker from the Chicago called Pablo Xavier. The realistic nature of this meme not only caused mass online confusion and amusement, but also started a viral conversation about morality, religion, and our expectations of our cultural leaders. Questions were also raised about the need for regulation within the space, given that a relatively anonymous figure could cause such impact, and potentially offence. Other AI artists such as Jonas Peterson use AI to create fantastically surreal fusions of art, photography, and fashion. These often include images of animals in beautiful couture, playfully satirising the human-centred bias of the Anthropocene. Advocates for AI believe that it can revitalise the fashion industry by democratically opening it to a new generation of web3 creatives. Pessimists worry that this new software will eventually render the current jobs of design development teams, fashion photographers, and graphic designers redundant.

Other serious ethical questions surround digital fashion. The expansion of digital fashion into gaming platforms with pre-teen user demographics, such as Roblox, demonstrates a predatory form of digital marketing. This normalises the relationship of fashion consumption and children's entertainment, whilst also seducing a new generation of future consumers towards luxury brands. Also, whilst many see exciting, transhuman futures in digital fashion, it also frequently resembles the dystopian futures of science fiction. Neal Stephenson's novel Snow Crash, released in 1992, which introduced the term 'metaverse', describes a generation of 'gargoyles' spending more time in virtual life than reality. Online addiction is a growing phenomenon in the age of social media and gaming, as is the online abuse which comes with both. Digital fashion will potentially make both of these problems worse. In many ways, digital fashion represents a complete capitulation to the image obsessed society pessimistically predicted by post-Marxist media theorists like Guy Debord. To sceptics, it represents an incomprehensible twenty-first century manifestation of the emperor's new clothes. It is widely claimed that phygital fashion could be a potential solution to excess fashion waste caused by the fast-fashion industry. However, this claim is at least partly based upon the optimistic premise that phygital fashion can satiate consumer need for real world fast fashion. Any environmental benefits of digital fashion must be carefully weighed up against the exorbitant energy consumption required to support the cryptocurrency blockchain. In an important academic study from 2022, Flick undertook a comprehensive ethical analysis of NFTs, revealing not only environmental concerns but also issues with security, privacy, exploitative practices, scams, and other forms of criminality. Much of these problems are exacerbated by the deregulated nature of web3 which, of course, its users valorise. The digital fashion sector must address all these ethical concerns if it is to realise the brave new world of its early promise.

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