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Ambient Machines: Synthesis in the Domestic Sphere

Abstract

The article undertakes an original reframing of the significance of modular synthesisers by attending critically to their audiovisual presentation alongside houseplants and other signifiers of domesticity. This visual framing—all too easily dismissed as decorative superficiality—is shown to be concomitant with a domestic imaginary and concerns for portability evident in the development of early North American synthesisers. Analysis of historical artefacts and interviews identifies the importance of portability to the realisation of a domestic imaginary in early synthesiser development. The contemporary emergence and audiovisual documentation of 'ambient machines' as recognisable configurations of modular instruments for the automatic production of ambient music is shown to develop these concerns towards the realisation of synthesiser as domestic appliance. Through the symbolic and functional pairing of plants and synthesisers in domestic settings the modular synthesiser comes to be associated with ideas of nurturing and care.

Introduction

The creation of 'ambient machines' has emerged in recent years as a distinctive audiovisual practice within contemporary electronic musicking. Ambient machines are specific configurations of modular synthesisers created for the automatic or generative production of ambient music. Composition of and with ambient machines has established a common mise-en-scène placing modular systems alongside various signifiers of domesticity such as pets and houseplants in videos distributed via online streaming platforms (Figure 1). This latter pairing identifies shared significance between the composition of ambient machines and the practice of bringing 'nature inside' (Sparke 2020) to both soften domestic interiors and provide opportunities for nurturing and care. The argument that follows shows how ambient machines extend a domestic imaginary that influenced the development of early North American modular systems; it unearths a neglected thread in the study of electronic musicking showing how the domestic sphere was and remains of importance to the significance of modular synthesisers.

[Figure 1]

The careful framing of modular synthesisers with plants and craft objects is easily criticised as a superficial distraction from their functionality and creative potentials, or as a greenwashing of their problematic ‘political ecology’ and eventual status as e-waste (Devine 2015; Rodgers 2011). This framing is seen to unduly elevate the decorative over the sonic qualities of instruments. The decorative qualities of instruments and sound reproduction technologies have long indicated their suitability for integration into domestic environments and their adornment has historically been at the service of expanding beyond a male dominated market for music technology (Kruse 1993: 12). Rather than dismissing this approach to the visual framing of synthesisers as superficial it should be understood to echo the importance of a particular and somewhat idealised domesticity in the historical emergence of modular approaches to systemic musicking. Rather than decorative superficiality, it will be shown how the audiovisual contribution made by ambient machines to domestic environments continues a longstanding desire for the distribution of both system and electronic music beyond institutionalised centres of control, with the home being an idealised site of experimentation and transformation.

The deployment of music technology in the home has been criticised for immersive tendencies serving gendered isolation and exception from domestic and reproductive labour (Keightley 1996). The ambient machines subculture largely upholds the masculinisation of music technology (Born & Devine 2015: 146–51) but nonetheless revitalises a neglected and nuanced narrative associated with the importance of portability for facilitating transit beyond institutionalised studio culture into the home and wider world. The aim herein is not to focus on portability as another example of music technology’s capacity for radically enervated 'democratisation' (Durant 1990: 193; Harkins & Prior 2022), but to look at the domestication of electronic musicking that it affords and its contemporary audiovisual aesthetics. This focus uncovers the significance of the ambient machine and how its domestication of contemporary electronic musicking communicates themes of care that—although far from overthrowing—offer significant counterpoint to narratives of dominion in discussion of electronic music systems.

To uncover the contemporary significance of the ambient machine the importance of portability in the development of early modular synthesisers and the establishment of a domestic imaginary is addressed. Discussion of the visual framing and functional coupling of synthesisers and plants explores how this pairing signifies care through the development of ambient aesthetics and a ‘receptive state’. These various threads are woven together to conclude that the ambient machine is best grasped as an instrument and domestic appliance deployed in acts of nurturing and the ethics of self-care.

Moving home

The importance of portability to the development of electronic instruments has overshadowed that of domesticity, which as a destination for increasingly mobile systems played an important role in defining the significance of early modular synthesisers. This neglect is perhaps due to a lack of glamour, the domestic use of synthesisers being initially less exciting than their various attendant futurisms, novelty and integration into notable professional working practices (cf. Drott

2021). The neglect of the domestic imaginary active in early synthesiser development reflects the wider tendency to isolate the domestic sphere and anything consigned to it from public debate (Fraser, 1990: 73). Chadabe exemplifies this, showing how portability was of particular importance to the development of twentieth century European and North American avant-garde and experimental electronic music, principally as a vehicle for studio composition's transformation into a performance art and movement into concert halls (Chadabe 1997: 81–107). A specific example given by Chadabe of this movement and its significance is the work of the San Francisco Tape Music Centre (SFTMC) who during the early 1960s worked closely with Don Buchla developing portable electronic instruments (Subotnick, Sender, et al., 2008). Although identifying the importance of portability to the development of new practices and forms of expression, Chadabe's focus on movement into the concert hall neglects the triangulation explicit in Buchla's early promotional efforts emphasising movement into the home (see Figure 2).

[Figure 2]

Concern for portability—which leads us to an understanding of the synthesiser's place in a particular domestic imaginary—was one element in the clamorous signifying operations active around the instrument's emergence, wherein its meaning and musicality was being negotiated (Pinch & Trocco 1998). The thread of portability found in the emergence of early Buchla systems can be followed back to the 'mediated domesticity' of contemporary electronic musicking in the domestic sphere that has become increasingly visible through its dissemination via social media (Barna 2022: 77). The focus herein on portability in synthesiser development is neither exhaustive nor principally technical, being primarily concerned with its conceptual significance in the emergence of early Buchla systems and the creative and countercultural thought of the artists associated with their development, specifically members of the SFTMC. This allows us to grasp the continuity of concern for portability and domestication between the modular synthesiser's emergence and its contemporary audiovisual representation in amateur and professional practice. Following this thread allows us to understand what modular synthesisers have come to signify within an ambient music context, a signification reinforced through a visual frame comprising plants and other signs of domestic interiority.

Portability has informed the design of modular synthesisers since the 1960s, being of importance to their commercial appeal, convenience of use and transportation. Beyond pragmatic concerns, portability had ideological significance, allowing the integration of modular synthesis into contemporaneous countercultural praxis. A 1973 promotional image for the Buchla Easel (Figure 3) shows Don Buchla reclining in a garden with a patch cable in his mouth, casually patching the instrument. Notably the instrument is not in a studio environment, it has travelled outdoors, a journey made easier by the compact portability of the instrument, contrasting significantly with the scale of earlier Buchla systems—system being a concept associated with an ability to scale (Siskin, 2016: 36) and most readily to scale up, something evident in the size of studio bound modular equipment with names such as Colossus and Monster.[1] There is a sunny, leisurely quality to the image not readily associated with Buchla. An instrument known for its embodiment of avant-garde experimentalism is here juxtaposed with a casual and domesticated

[1] See the Analogue Solutions Colossus (Analogue Solutions, n.d.) and the Doepfer A-100 Monster cases (Doepfer, n.d.).

form of nature, surrounded by plants neatly contained in beds; Buchla's cuffs are undone giving the impression of someone at ease, ready to roll up their sleeves and get a job done.

[Figure 3]

The image of (the) Buchla in the garden marks a waypoint in the synthesiser's path from institutional studio environments to homes and gardens before continuing into the great outdoors as seen in more recent yet retrofuturistic uses of portable Buchla systems in the work of artists such as Johnny Woods, who broadcasts 'synthesizer videos from an off-grid Earthship, high in the mountains of New Mexico' via social media (Woods, n.d.). The latent desire for ease of movement beyond studio environments can be seen in advertisements for the earlier 100 Series Buchla Box, which despite being of a scale that would fill a generous dinner table, boasts portability facilitating movement between the studio, the concert hall and the home (Figure 2). Relative to the scale of cold war era synthesisers that preceded it—such as the RCA Mark II installed at the Columbia-Princeton Electronic Music Centre (CPEMC) in 1959—the Buchla Box was a lightweight solution facilitating both the composition and performance of electronic music, yet the size and cost of this instrument still inhibited the casual move outdoors realised with the development of the Easel and its suitcase-style housing. This portability responded not only to concerns for commerce, convenience and ergonomics but to the cultural politics informing the social construction of early synthesisers, specifically a contemporaneous desire for the countercultural decentralisation of systems (Turner 2006) and the domestication of electronic musicking evident in the activities of the SFTMC. When compared to tape music techniques, the relative immediacy of musical expression that these systems afforded and their ability to move into the home and project studio helped composers involved in their development to realise a latent desire for the autonomization of 'music as studio art': the collapsing of composer, performer and audience distinctions into a single auto-creative entity (Subotnick 2008). In addition to supporting the pursuit of greater freedom, autonomy and efficiency in musical expression, the scaling down, distribution and localisation of synthesis—relative to systems such as the RCA Mark II—supported the aim of enhancing access (Bernstein 2008: 31) to electronic musicking through its domestication.

For Ramon Sender (2008: 47) writing in 1964 the endeavours of the SFTMC sought to coalesce musical experiments happening in domestic settings, engendering a more collective creative voice. In the writings of SFTMC members and promotional literature for the associated Buchla systems we find electronic musicking continuously negotiating a domestic imaginary. Movements towards a domesticated electronic musicking were facilitated by the development of increasingly portable systems not requiring the scale of financial and infrastructural support associated with institutionalised electronic musicking at the time. Prior to the emergence of Buchla systems, electronic music had been associated with the institutional pursuit of cultural supremacy during the cold war (Brody 2020; Cohen 2020; Vandagriff 2017); the scale of the RCA Mark II and the institutional context of its deployment associated it with the dominion of system. The pursuit of portability evident in early advertisements of Buchla systems sought to escape this institutional context through a localisation and distribution of synthesis and system as generative concepts. In explicit contrast with the scale of, and limited access to, the CPEMC's resident RCA synthesiser, Subotnick summarised the rationale for scaled down, distributed and portable systems as allowing anyone to 'create with sound in their living rooms' (Subotnick,

Payne, et al. 2008: 114). This contrasts with the scale of other instruments and the idealised sites of their usage, distinguishing rarefied institutions from the multifaceted contestations of everyday domestic environments. The pursuit of portable, scaled down and distributed modular systems supported electronic music as rarefied studio art but simultaneously the domestication and development of more quotidian electronic musicking, the idea that 'each person could have a little black box in their home to make music' (Subotnick, Payne, et al., 2008: 132). Emerging within the countercultural context described by Turner (2006) the pursuit of portability in the development of Buchla systems helped to realise a desire for sound synthesis to move beyond the professionalised public sphere of universities and research institutions into a private sphere adapting to changes inaugurated by the 'machine age' automation of aspects of domestic labour such as washing and food preparation (Rosner 2005, 2020).

The role of a domestic imaginary in determining the evolving significance of the synthesiser was not limited to the early practices of Buchla and associates as can be seen in a later (c.1982) advertisement for the Serge system featuring the composer Todd Barton (Figure 4). In this image Barton sits in front of a Serge synthesiser with other instruments visible in the background suggesting a studio environment. The text accompanying the image introduces Barton as musical director and representative of Hi-Fry Foods, promoting demonstrations of the—fictional—company's digital food processor, the 'Digi-matic' into which we might feed basic food types to be mixed into casseroles and simple dishes with the further option of un-mixing of ingredients via feedback. Beyond the puns, this advertisement shows the domestic imaginary at work in electronic musicking; the text's whimsy lightens a serious underlying commitment to the countercultural domestication of electronic musicking present in the emergence of system, modularity and voltage control as concepts active in the development of electronic musicking. The advertisement presents the Serge system as a bridge between the visible studio environment and a domesticated scene of exploratory synthesis both sonic and culinary.

[Figure 4]

Despite the importance of portability in their development, the cost and limited quantity of Buchla systems resulted in few escaping the professional sphere of institutional studios, a coupling compounded by the avant-garde aesthetics shaping their affordances (Gaver 1991). The ideal of portability used to market the 100 series system and more convincingly embodied in the Easel—originally selling less than 50 units—can be seen to have persisted throughout subsequent developments in modular synthesisers which, via an expanding 'cottage industry' serving amateurs and professional musicians alike, have more effectively realised the desire for portability and domestication evident in the development of early systems. This has been most successful in the more compact dimensions of Eurorack systems which have risen to prominence since the introduction of the Doepfer A-100 series in the mid 1990s, but is also a notable feature in the design and imagined use of the portable yet esoteric *Ciat Lonbarde* instruments emerging in the early 2000s and the more commercially oriented Teenage Engineering *Field System* (2022-). The domestic imaginary evident in modular electronic musicking perhaps culminates in the online proliferation of ambient machines: modular synthesisers configured for the automatic and often generative production of ambient music, framed in domestic settings and treated in a manner concomitant with a historical interlinking of musical instruments, automatons and

domestic furnishings (Barnett 2006; Clouston, 1905; Voskuhl, 2013: 86–127) as dynamic objects enlivening the home.

Ambient Machines

In contemporary electronic musicking, the use of modular synthesisers is often an audiovisual practice, wherein the visible qualities of the instruments, their internal automatic operations—made visible by flashing lights and displays—and intermittent 'tweaking' by artists or 'synthesists' is of comparable significance to their sonic output. In addition to their frequently undisclosed use in composition, the instruments are often the central focus of videos produced by a range of amateurs and professionals. In these videos it is not only the automatic music that is conveyed but the visual aesthetics of the instruments themselves. Of particular interest is the aestheticisation of modular instruments within domestic contexts, wherein they function as instruments and decorative objects enhancing the aesthetics of the home. When configured specifically for the automatic production of ambient music and aestheticised as decorative objects enhancing the visible qualities of the home, these instruments become recognisable as ambient machines. This phrase is taken from *My Ambient Machines*, a 'zine published by the Swedish artist Oskar Karlström since April 2022 focusing on interviews with artists and instrument builders (see Karlström, n.d.). Often accompanying the interviews are images showing synthesisers in domestic settings (Figure 5).

[Figure 5]

The phrase 'ambient machines' describes a specific usage of modular synthesisers, it specifies cultural technique (Siegert, 2007: 29, 2012) in the design and use of modules, configured for the automatic or generative production of ambient music. Ambient machines are composed through the careful choice of modular components and their integration into a system for the automated production of ambient music and sonic interiors (cf. Magnusson 2019: 118). Ambient machines embody a systemic approach to composition: the composition of systems and by way of systems controlled or influenced through parameter changes and programmable sequences of events. Once configured, ambient machines run largely autonomously for extended periods of time. Primarily an audiovisual practice, the videos of generative ambient machines often run between 5 and 240 minutes. The duration and ambient aesthetics of these videos demonstrates compatibility with and responsiveness to ubiquitous listening via streaming platforms deployed as functional 'mood machines' in everyday life (Pelly 2025, 41-58). Yet the 'new simplifications' (Hesmondhalgh 2022) within streaming criticism belie the complexities of this often functional musicking and the DIY, participatory culture in which it is embedded and to which the audiovisual dissemination of both product and production process in these videos contributes. Although devoid of much visible human activity, there's a sense that when consuming these videos both we and the artist share the space of the listener. Common practice is to produce videos focused on the ambient machines themselves, documenting their sonic output and visual feedback on their internal operations. Equally standardised is the way that these scenes are occasionally interrupted by a hand reaching into the frame to change a parameter or reposition a patch cable (Figure 6).

[Figure 6]

This gesture is a sometimes surprising reminder that a human is present, overseeing the automated production of ambience; the simplicity of this gesture indicates the presence of another *listener* more than a performer to be observed, reaching in to encourage or restrain a generative system on its meandering path across carefully selected parameters. The site and means of production and consumption render ambient machines distinct from the integration of synthesisers into more typical production workflows. In the latter, public consumption of recordings or performances is anticipated, stems are often assembled with release from the (home-)studio in mind. In this scenario the use of synthesisers in the private sphere anticipates release into the public sphere; music is composed with exit from the domestic sphere in mind. In contrast with this exit from the domestic sphere, ambient machines often form a bridge or remain embedded within it. This movement of modular instruments into the home and the domestication of electronic musicking establishes the social and conceptual conditions for the emergence of the ambient machine as a recognisable configuration of electronic instruments. The idea of the ambient machine is centred on a conception of domestic musicking wherein music is produced in a semi-automated fashion for self-enjoyment and self-care in the operationally closed system of the domestic sphere. Where this auto-affective circuit is shared online the audiovisual dissemination of ambient machines is orientated towards a bridging of domestic spheres rather than exit from them.

As automated systems, ambient machines participate in established narratives concerning the decentralisation and destabilisation of composer and listener due to varying levels of agency ascribed to machines (cf. Boden & Edmonds 2009: 38–42) and the incompletion of ambient aesthetics that integrates and augments the site of production. In these scenarios we find a number of simultaneously active, overlapping yet not concentric spheres of production that include the roles of composer, listener, automated instruments and the domestic environment that is often visible and occasionally audible in the documentation of ambient machines. Although operationally closed the domestic scene of automated electronic musicking remains open for a public's visual pleasure (Mulvey 1975) through various 'rear windows' into the private sphere made available via social media and periodicals such as *My Ambient Machines*.

Receptive state

Although enmeshed in consumerism, collector culture and the—necessarily unachievable—desire for systemic completion, the domestication of electronic musicking can be seen to achieve something irreducible to a retro-futuristic 'hygge' through the juxtaposition of modular synths, house plants, handmade crockery and other material signifiers of amateur and artisanal craft. The question of what—beyond affluence and consumerism—and how the domestication of modular synthesisers signify is addressed through comparison with Pinch and Trocco's account of their social construction. The contemporary ambient machine is frequently keyboardless; this same lack of a piano-keyboard contributed to semantic instability around early synthesisers (Pinch & Trocco 1998) rendering their perceived purpose, functionality and musicality uncertain. Although this confused many would-be consumers, this unstable signification also appealed strongly to experimental musicians; the absence of a piano keyboard suggested new potentials, affordances and a 'deterritorialization' of electronic musicking. Pinch and Trocco (2002) describe how Robert Moog's developments of the early synthesiser—contemporaneous to the

development of the Buchla system discussed above—through the addition of piano-keyboards and promotional photographs portraying established and recognisably musical technique stabilised the synthesiser's signifying operations and brought about a 'reterritorialization' or resolution of its status as a source of uncertainty.

The keyboardless configuration of ambient machines could be understood to reference the perceived experimentalism of the early synthesiser, but this neglects the stabilising function of its visual framing. Whereas Moog's early promotional photographs depicted performers with their hands adjusting unfamiliar dials while playing familiar piano-keyboards, stabilizing the synthesiser as a recognizably musical instrument (Pinch & Trocco 1998: 11, 16), the hands occasionally entering the common mise-en-scène situating contemporary ambient machines among signifiers of domesticity, organicism, nurturing and (self-)care performs an alternative symbolic stabilisation. Rather than maintaining the openness, uncertainty and experimentalism of the early keyboardless synthesiser the contemporary ambient machine's lack of keyboard, with the assistance of specific visual framing signifies the adoption of *a receptive state* and ambient interiority. This framing signifies that these are not instruments for virtuosic *expression* and overtly gestural interaction, but machines domesticating experimentalism to be engaged with in a receptive state.

This receptive state can be identified in a relatively early period of electronic music's development. Discussing the creation of what were usually short-lived automatic sound generating circuits based on cybernetic principles, Bebe Barron describes how listening to the auditory output of these circuits drove her and Louis Barron to cede expressive control. In this creative workflow the expressive will was supplanted by the adoption of a receptive state: 'we would just sit back and let them take over, we didn't want to control them at all […] we were in a very receptive state' (Barron 2009; cf. Collins et al. 2013: 79). Yet rarely is this ceding of control total. In the visual presentation of contemporary ambient machines we regularly see a hand at the controls, moving in and out of the visual frame to occasionally adjust a parameter with varying degrees of gestural legibility. The simple gestures and infrequent moments of interaction indicative of this receptive state signify not free flowing experimentalism or virtuosic expression but a receptive mode of engagement accompanying the collapsing of composer-performer-listener distinctions.

Through this mode of interaction artists exercise control and communication by influencing behaviour and nurturing the development of a system. Where these gestures entail the activation of automatic or generative procedures they result in a mode of interaction akin to operating domestic appliances: parameters are set—temperatures and probabilities, durations, delay timings, the frequencies of oscillators and spinning drums, etc.—and processes are activated. The concordance between ambient machine and appliance receives clear expression in Yuri Suzuki's *Ambient Machine* (2022, Figure 7), a 'sound conditioner' to be nestled among other domestic appliances (Suzuki, n.d.). Developed during the COVID-19 pandemic, Suzuki's *Ambient Machine* provides automated, dynamic sonic atmospheres and masks auditory distractions. Suzuki's *Ambient Machine* is an autonomous system, its singular function and explicit tactility distinguishing it from general purpose computers and smartphones, aligning it with the wider post-digital (Cramer 2014) appeal of modular synthesisers. The *Ambient Machine* was designed to assist affective self-regulation, control and productivity in the home as a multifaceted

workplace in which varied forms of professional, domestic and reproductive labour were undertaken for a suddenly expanded population (cf. Thompson & Drott 2022). A matrix of switches allows for the activation of precomposed music, environmental recordings and effects, this simple mode of interaction designed for domestic deployment bears similarities to the activation of automated domestic labour and interior conditions: laundry, dishwashing, microwaving, lighting, air conditioning, etc.. Although simpler in design, Suzuki's *Ambient Machine* distils a shared purpose, significance and set of gestures associated with more elaborate modular synthesis based ambient machines documented online and in the *My Ambient Machines* 'zine. Also emerging in 2022 *My Ambient Machines* follows the same 'lockdowns' to which Suzuki's *Ambient Machine* responded, a period heightening the significance of ambient musicking in the home and the desire to experience the domestic environments they contribute to directly or via the mediation of social media.

[Figure 7]

In contrast to the immersive and often gendered isolation evident in videos documenting home studios and modular synthesiser filled 'man caves', we also find ambient machines situated within, rather than isolated from, scenes of domesticity and homebuilding, notably in the work of artists such as Wac-Lounge, Ann Annie, Per Barfot and Emily A. Sprague.[2] It is in these latter, perhaps marginal applications of this technology that we see most clearly how the thread of portability woven into the social construction of the early modular synthesiser has found its way into an idea of contemporary domestic musicking understood as an act of care. The modular synthesiser as domestic appliance is exemplified in Johnny Woods' *Buchla Box for Baby* (Woods 2022). This recording—comprising around four hours of gentle generative noise from a Buchla 100 system—was developed as a sleep aid while caring for a newborn. A simple generative patch involving noise generators, bandpass filters and long duration function generators would be left to produce dynamic and soothing noise throughout the night, being occasionally 'tweaked' by Woods. Following a restful night for the whole family, that particular configuration would be judged successful and the output of the patch would be recorded. Those recordings were selectively compiled for *Buchla Box for Baby* (Figure 8).

[Figure 8]

The domestication implicated in the ambient machine does not jettison experimentalism but repositions it within a diffuse continuum wherein modernism's desire for rupture and renewal merges with the home as a technologized site of ongoing 'experimentation and transformation' (Rosner 2020: 2). Ambient machines emerge as devices compatible with this already technologized domestic environment. Instead of novel aesthetic qualities, the experimental operates here at a functional level within a domestic assemblage (Deleuze & Guattari 2004: 337), an exploration of appliances and processes within the mechanics of domestic and reproductive labour. The receptive state encouraged by the affordances of the ambient machine is entwined with the development of ambient aesthetics, contrasting with the avant-garde experimentalism

[2] Examples of from each of these artists can be found at the following locations: Wac-Lounge: https://youtu.be/sk8YKC8Wdrk?feature=shared, Emily Sprague: https://youtu.be/2JjwFbEGbXM?feature=shared, Ann Annie: https://youtu.be/wmwM1TcOX-c?feature=shared, Per Barfot: https://youtu.be/EvgOsJqxvBs?feature=shared

that keyboardless modular synthesisers have historically signified. The keyboardless interface of the ambient machine thereby signifies not unbounded creativity but receptivity, care and pleasure via the functional domestication of experimentalism.

Ambient interiors

Ambient machines embody a systemic musicking that collapses the roles of composer, performer and listener in a schema broadly concomitant with the likes of David Tudor and Morton Subotnick, yet contra Sanfillipo (2023) ambient machines entail the aesthetics of not-particularly-complex systems. Ambient machines are heard to be far from the edge of chaos in the context of contemporary electronic music. The systemic production of soothing ambient interiors replaces the acceleration of complexity. Here Eno's aesthetics (Eno 2004) are embedded within the context of domestic and reproductive labour (Federici 2019: 17). With the activation of the ambient machine, automatic ambient musicking becomes akin to automatic washing, coffee percolation, baking, modular instruments as domestic appliances providing comforting and continuous sonic furnishings to the home, an augmentative and integrative acoustic tint accommodating without demanding focused attention.

Sound technologies can partition space via auditory means. Keightley (1996) described how home hi-fi equipment can transform a suitably isolated domestic space of leisure into a venerated sanctuary of audiophile experience, creating immersive isolation for the occupying and usually male listening subject. Contrasting method and medium can be found in McLuhan's (2006: 48) brief account of teenagers becoming adept at producing a private auditory space by way of radio 'territories' (Jensen & LaBelle 2007: 7–13), a practice that is increasingly mobile in contemporary culture allowing for transitory and roving isolation wherever it is needed. For McLuhan this immersive isolation provided auditory space for focused study, something that in a time of ubiquitous mobile media has been adapted into a general purpose bubble for the consolidation of adolescent subjectivity. The aesthetics of the ambient machine contrasts with the volume implied by Keightley's 'Turn it Down', and therefore the nature and form of its spatial partitioning is also distinct. Enveloping yet incomplete, open and interdependent, the relative quietness and sparseness of the ambient machine's output establishes a permeable membrane or filter in contrast to the immersive isolation achieved through volume. Whereas extremes of dynamic range appealing to the audiophile might presuppose an ideal and isolated listening environment that makes such details clearly audible, the permeable sparseness of much ambient music—and the room sound audible in some ambient machine videos—serves to invite and 'tint' the audible intrusions of the environment it occupies.

Synths and plants

The pairing of plants and ambient machines most clearly signifies the latter as a vehicle for care in the domestic sphere. This framing posits a connection sometimes conceived as an idealised 'essence' common to plant and machine, or through the nurturing opportunities that both provide for the artist. This symbolic pairing can be understood via Sparke's (2020) history of house plants while a more physical pairing via modules specifically designed to connect plants and synths makes the significance of this pairing functional.

[Figure 9]

The visual framing of synthesisers by plants further stabilises the instruments' signifying operations, contributing to the ambient machine as a recognisable configuration of modular components. This visual frame indicates the ambient aesthetics expected of the instrument's musical output and the receptive state governing engagement with it. Modules such as the Clatters *Garden Listener* or the Instruo *Scíon* create physical connections with plants that visibly soften the hard edges of modular instruments, signify therapeutic ambience, and functionally integrate them into the synthesiser through the generation of signals via techniques used in galvanic skin response (Figure 9). When compared to earlier uses of this technique within electronic music such as Rosenboom's (1972) *Portable Gold and Philosophers' Stones (Music from Brains in Fours)*, we see a shift from attempts to further integrate the human body and its autonomic operations into electronic musicking to a less anthropocentric desire to engage with the non-human. This is not to disregard the somatic in pursuit of the absolute but to decentralise human embodiment and control within a system organised to prioritise receptivity, listening and care, recalibrating the artist's role in a continuation of the collapse of composer, performer, listener distinctions realised for Subotnick via the portability of early Buchla systems.

'Biofeedback' modules provide an interface between plants and common components of modular synthesisers such as oscillators, filters and function generators. Electrodes connected to the surface of the plant allow for measuring variations in the conductivity of the integument. The electrical signals generated are scaled and elaborately quantised for use as control voltages and gates within a modular system, yielding voltages suitable for determining pitches in a variety of musical scales or triggering musical events that are predetermined to differing degrees. Seemingly in response to the amount of transformation this quantising entails—diminishing the sense of 'direct' correlation between plant physiology and the signals the module yields—the Intstruo *Scíon* provides a 'raw' unquantized output suggesting a greater degree of proximity to the plant and its non-human pulsations (cf. Keats 2023). A simple 'patch' would involve connecting a houseplant to one of the aforementioned biofeedback modules to generate voltages suitable for controlling the pitch of an oscillator as well as gate signals to trigger an envelope generator. This would result in an irregular stream of notes quantized to a chosen scale (Figure 10). Although claims of 'making music with plants' overstates the role of the plant in the determination of musical events, such modules nonetheless allow the artist to carefully and selectively cede degrees of control to a biometric system that provides a functional point of contact with the organic. This connection is also symbolic of the perceived purpose, meaning and 'essential mode of functioning' (Wiener 2013: 44) of the ambient machine as a homeostatic device for the control of sonic atmospheres. Through this connection with plants we witness less an opening onto the environment outside a system than its expansion to selectively integrate organic components, and so Luhmann's differential definition of system persists (Luhmann 2013: 44).

[Figure 10]

This coupling of plant and machine is indicative of a mode of thought wherein nature as both process and natural objects—both natura naturans and natura naturata (Spinoza 1955: 68)—is not

only exploited in technological development but functionally integrated into technological operations. Rare earths are extracted and used in the production of modular components while the plant as symbolic representative of the Earth and non-human nature is integrated into the modular synthesiser's operations.[3] The plant's role is therefore both symbolic and functional; beyond signifying well-being, affluence, and serving to further greenwash (cf. Rodgers 2011) and soften the hard edges of domestic interiors and musical machines alike, the plant signifies a long-standing understanding of generative and systemic approaches to musicking as being aligned with particular conceptions of the natural and organic.

Functionally coupled to recognisably natural objects by way of dedicated modules and sensors, the ambient machine exemplifies Wiener's 'sensitive automata', a coupling that is understood to be instrumental and—for both Wiener and the proponents of 'organismic synthesisers' (Soma Laboratory, n.d.)—metaphysical, indicating a shared 'essential mode of functioning' between the living organism and sensitive automaton (Wiener 2013: 43–4). The 'mechano-organicism' (Hui 2020: 55) arising from this framing of the automated modular system is commonplace in descriptions of the behaviour and sonic qualities of electronic music systems and synthesisers (Kröpfl 1997; Truax 1990: 131; Vega 1965: 2). Electronic music systems are frequently described in terms of organisms in attempts to account for the allure of their dynamic, evolving and sometimes unpredictable behaviours. The conceptual binding of system and organism in electronic music has been concisely summarised by Bischoff and Perkis (2007) of The League of Automatic Music Composers, who locate systemic approaches to electronic music in the context of countercultural adoption of complex systems theory, chaos theory, synergetics and cybernetics. Where these theoretical paradigms *analysed* complex phenomena as the product of simpler interacting parts, composers responded with the *synthesis* of 'life-like' complexity from the dynamic interrelations of relatively simple components such as oscillators, function generators, microcomputers, amplifiers and filters. In their brief reference to system theories' impact on the experimental electronic music practices in the 1970s and 80s, Bischoff and Perkis identify the conceptual bridge joining the electronic music system and the natural organism in the minds of artists and listeners. The conceptual synthesis of modular systemic musicking and organism provides the epistemic framework through which the presentation of modular synthesisers alongside plants meaningfully signifies commonality between the two.

The significance of bringing plants indoors has transformed over time; by the end of the twentieth century house plants ceased compensating for the loss of rural existence and access to nature, to signifying a broader environmentalism and ecological thought. This contrasts with the rationalised containment and taxonomies of previous centuries' colonialist practices of plant-hunting (Sparke 2020: 15, 45, 182–3). In addition to symbolising these broader ideological commitments, Sparke describes how house plants continue to have a primarily emotional rather than rational appeal; they are brought inside not to be studied but to craft a home, to counterbalance an overdependence on technology and ubiquitous computing, to provide nurturing opportunities and acts of care, and to ease psychological and spatial tensions of the contemporary domestic interior (Sparke 2020: 197). It is this complex signifying operation that most accurately explains the pairing of ambient machines and plants. Beyond functional integration via biofeedback modules, the care and ecological thought that plants signify is seen to relate to the purpose of ambient music and its automated embodiment in ambient machines. The

[3] Cf. Gilbert Simondon's (1980: 51–9) concept of the techno-geographical environment.

opportunities for nurturing an other that plants provide contributes to the creation of a reciprocal relationship entailing care for the self. Insertion into this relationship between plants and humans results in simile between the synthesiser and aspects of the house plant's twentieth century significance, signifying a somewhat abstract ecological thought and the pursuit of emotional wellbeing.

Beyond expression of commonality—Wiener's 'shared essential mode of functioning'—the visual coupling of house plants and synthesisers affixes the former's signification of care and domesticity to the latter. The plant requires care, and the gestures of caring for the plant—watering, pruning, rotating, dusting—have a patient simplicity reflected in the occasional adjustment of the ambient machine's parameters during documentation. Care for plants is reflected in care for the self, enacted through the production of augmentative ambient interiors. Through the nurturing of plant and patch a therapeutic system for care of the self is created.

Ethical Instruments

In their pursuit of a new organology Tresch and Dolan (2013) called for a shift in focus from the study of instruments to a study of the *relations* and reciprocal cycles of influence existing between musical instruments and human behaviour. The study of instruments should not only account for the invention and modification of instruments over time, but also for the way that instruments shape human behaviour and practices of the self. Beyond expressing the creative will, musical instruments embody ethics; being both functional and symbolic, they facilitate the often oblique realisation and representation of ideas about desirable conduct in the world. As influential and dynamic objects, instruments are considered operative upon not only aesthetics but also thought, transmuting the will and the forms it takes—through what often appears as a co-creation (Carey 2025; White 2022, 2023)—rather than voicing it transparently. Despite the problematic political ecology of their material composition and a wider compulsion towards collection and system expansion, the desirable behaviour manifest in the composition of ambient machines is focused on self-care and receptivity in domestic environments.

In our homes we (re)produce ourselves and it is into this broader 'machine for living' that the ambient machine as domestic appliance is installed (Le Corbusier 2008: 266). Transforming Pickering's optimistic ethics of cybernetics (2011: 385) for the more localised domain of ambient electronic musicking, the circuit of care signified through pairings of plants and synthesisers in domestic environments outlines a distinctly Foucauldian ethics. Foucault's ethics—conceived as an aesthetics of existence (Foucault 1997: 255)—was focused on care for and auto-creation of the self by way of a 'practical system' (Foucault 1984: 48–9), which here is a practical system of domesticated, ambient and automatic musicking. Domesticating the concept of system in electronic music by placing it alongside houseplants, ambient machines signify (self-)care, nurture and receptivity, providing permeable envelopment more than immersive isolation, their acoustic bubble expanding to include the home through the automated production of ambient interiors rather than exclude it through immersive isolation.

Conclusion: receptivity and care

An enervated spectre of Attali's 'Composing' will no doubt be felt haunting this discussion of ambient machines. Many traits of Composing are evident in the ambient machine: the collapse of composer-listener distinctions, the focus on instruments and the prioritisation of immediacy and auto-affective pleasure in the process of production (Attali 1985: 140–7). Yet Composing's radical, prophetic potential is diminished at best and almost entirely apprehended by the rubric of the prosumer. Hindsight reveals naivety in the polemic of Composition yet the failure of a revolutionary epochal shift from Repetition—arguably stronger than ever in the age of streaming—should not cause us to discard the smaller contributions made in this more modest and localised realisation of Composition to a reframing of music technology's potential significance in the domestic sphere.

The ambient machine has been shown to be recognisable as a distinctive contemporary instrument that continues a process of domestication active since the emergence of modularity in electronic musicking. By returning to the importance of portability in the development of early modular synthesisers and assessing the overlooked significance of this concern beyond its obvious practicalities we see how common practice in contemporary mise-en-scène pairing plants and synthesisers—easily dismissed as superficially decorative—elucidates the gradual realisation and proliferation of a latent meaning embodied in the development of early modular systems. This provides an alternative understanding of portable electronic instruments focused not on hackneyed claims of democratisation but the implications of their domestication beyond immersive isolation. Despite its neglect in favour of more 'serious' avant-garde pursuits, domestication has been a generative concept throughout the development of systemic approaches to electronic musicking. Consequently the audiovisual presentation of domesticated electronic musicking in contemporary modular synthesis videos is not entirely reducible to a superficial performance of affluence and wellbeing that maintains 'gear acquisition syndrome' (Herbst & Menze 2021) for the benefit of the music industry, but should be recognised as continuing a longstanding desire for the distribution of both system and electronic music beyond institutionalised centres of control, with the home being an idealised site for ongoing experimentation and transformation.

The emergence of the ambient machine entails the focus on avant-garde practices giving way to a functional orientation wherein the modular synthesiser is reconceived as a domestic sound conditioning appliance for the automatic production of enveloping sonic interiors. Where the focus on care seems self-evident the aesthetics of ambient machines, it is the specific method of creation via generative modular systems in predominantly domestic settings that creates a distinctive circuit of auto-affective ethics in contrast to wider ambient music practices. Here the ambient machine continues another longstanding interest in developing creativity through the adoption of a receptive rather than principally expressive state in electronic musicking (cf. Viola 2004: 50). Mirroring the significance of bringing nature inside detailed by Sparke, the sonic conditioning provided by ambient machines provides opportunities for nurturing and self-care, they become productive appliances for homemaking in counterpoint to sound reproduction technologies for immersive isolation and exception, contributing to the home as a site for the care and (re-)production of the self.

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Captions

[Figure 1] Screen shot from a Per Barfot YouTube video of a modular synth performance. Image credit: Anders Nilson.

[Figure 2] An advertisement for the Buchla 100 system (c. 1970). Third on the list of notable features is: ‘lightweight modules provide portability for composer's home, concert hall, studios’. Image credit: Buchla U.S.A.

[Figure 3] Promotional image of Don Buchla using the Buchla Easel in a garden. Image credit: Buchla Archives.

[Figure 4] A c.1982 promotion for Serge synthesisers featuring Todd Barton from the KSOR national public radio newsletter. Credit: Todd Barton.

[Figure 5] A page from the *My Ambient Machines* ‘zine showing synthesisers in a domestic environment. Image credit: Oskar Karlström.

[Figure 6] Screenshot from a YouTube video showing the hand of the artist Idra adjusting a modular synthesiser. Image credit: Francesca Pavesi.

[Figure 7] Yuri Suzuki’s *Ambient Machine*. Image credit: Yuri Suzuki.

[Figure 8] Cover image for Johnny Wood’s *Buchla Box for Baby* album showing a Buchla 100 patch. Image credit: Johnny Woods.

[Figure 9] Screenshot from a YouTube video showing the artist Idra performing with modular synthesiser and houseplant. Image credit: Francesca Pavesi.

[Figure 10] Block diagram using Allen Strange's (2022) notation showing a basic modular synthesiser patch integrating a house plant via a 'bio-feedback' module.