

When homes become data: ethical and legal dimensions of the aesthetics of living

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Abstract

This paper will investigate how homes emerge both as a legal construct and an aesthetic environment, whereby architecture and interior design translate human identity into data-driven environments in a time when housing is increasingly mediated by artificial intelligence and sensor technologies; it explores the ethical and legal dimensions of the datafication of domestic life in the European Union, focusing on the GDPR, AI Act, and related design norms, shaping accountability, transparency, and privacy by design through which personal identity materializes. Building on previous research in data protection, human focussed design, smart living, and environmental psychology, this study places the home as a space where aesthetic intention and personal data converge. An interdisciplinary approach involving the blend between doctrinal analysis of EU data protection law and insights from contemporary design practice, one finds that personalized, AI-assisted environments often process special category data: health indications, emotional preferences, cultural, religious, and lifestyle references, transforming homes into a non-verbal portrait of its inhabitants, encoding individual subjectivity into the material and spatial form of the home. Results show that aesthetic personalization, sustainability, legal compliance, and emotional resonance are related to each other in a complex interaction in which design serves as a psychological vessel that reflects values, cognitive styles, and lifestyle aspirations. The intersection underlines creative freedom, which is given to a tension between data ethics and lawful processing, with particular emphasis on the architecture for preferences, and self-perception. From these, several implications result, especially for the key role of personal data in constructing smart living as an ethical and affective ecosystem in which architecture and design lead to self-determination and collective well-being. The value of the paper lies in its integration of data protection law, AI ethics, and design aesthetics into a unitary conceptual framework, redefining the smart home as a data protection, emotionally intelligent, human-focused space.

Keywords: EU Data protection law, smart living, AI ethics, architecture, home identity, human well-being.

1. Introduction

Within the last years, the house has been radically transformed from a purely physical environment to a digitally enabled space, where artificial intelligence and sensors interact in a process of algorithmic personalization. This process is the expression of a society change, in which the ordinary domestic activity, ranging from light and environment to the concern for emotional comfort and ambiance, is ever more supposed by a system able to perceive, predict, and interpret human behaviours. Between architectural decisions based upon machine learning and the intersection of aesthetic experience and the process of information, the terms of the modern European house are oriented towards the sensitive point where privacy is embodied in the form of data in permanent circulation.

All of these trends give rise to important issues concerning the development of the domestic in the digital age, what is meant by the notion of *becoming data* in domestic space, and how should such space be regulated both in terms of ethics and the law. The current discussion focuses instead on how the domestic is becoming a construction, that is to say a legal and aesthetic product taking place through the datafication of the domestic space. It explores interactions of AI and sensor-based personalization, monitoring and responsive architecture with European regulatory policies, in particular General Data Protection Regulation (GDPR) and Artificial Intelligence Act (AI Act). Though the literature has provided detailed discussions of smart homes, privacy engineering, emotional design and human-technology relations, among others, less attention has been given to an integrated perspective with regard to legal liabilities, ethics considerations and aesthetic features. What one can say for certain is that personal data, with the focus being on special categories of personal data, is at the heart of what infrastructures and users alike make a smart home do and mean. Less evident is how this data reconfigures the home as a regulated space, and enlightens rather than darkens its aesthetic and experiential dimensions. In the EU, where digital innovation happens in concert with strong human rights standards, this article places the home as a place where legal norms, technologies and architectural forms of expression come together.

The need for this research emerges in view of the fact that there is increased awareness that data-driven design does not only pay dividends in functionality but also yields new forms of subjectivity and identity relationships. As personality-adaptable (adjustable by user's emotions, cultural preferences, health patterns and lifestyle desires) domestic spaces expand the individual as the home transfers data to an expression of self, or sorts of affective profile. This transformation raises certain questions concerning how normative regulation should respond, in terms of being responsive to responses about the ways in which these environments are undercutting traditional understandings of autonomy, privacy and domestic intimacy? and of course which tensions arise between the freedom of architects, designers or engineers to innovate and the duty to respect human rights, dignity, informational self-determination? Thus, the article emphasizes the need to understand how law, ethics, and design intersect in shaping our future world.

This work underlines the concern in the inter-disciplinary area related to the phenomenon of smart homes and the corresponding digital footprints, but at the same point, there is a notable gap in the area of current and corresponding research studies in the domestic design area and the corresponding legal changes and developments in the legal environment area. The current studies in the area focus either on the legal side or the corresponding experience design and try to analyse how the legal and experience designs relate to each other and how the data-driven personalization approach changes the home into a corresponding hybrid form that represents conceptual changes in the socio-legal and aesthetic domains. To fill this gap, the current article foresees a protected domain in the European home that is both legal and aesthetic, addressing the question: *How does the datafication of domestic space transform the European home into both an aesthetic and legally protected environment?* through the interlinking of the GDPR, the AI Act, and the ideas of design ethics. The question will provide the way through which the interests of individuals in taste and emotional data will produce new legal subjects through the AI Act

and the GDPR. The article promotes a conceptual framework that brings together EU data protection rules and art and architectural aesthetic notions and AI ethics rules and guidelines; it also presents the home space as an interface of ethics, laws, and aesthetic values where the issues of privacy and data protection, as well as the definition of property and personhood in these private spaces, are sometimes characterized by the element of personalization and data governance. The paper evaluates aesthetic subjectivity in relation to data governance and shows how emotional and cultural data produced by AI tools form the basis of legal construction of privacy and autonomy rights.

2. Methodology

The article involves transdisciplinary qualitative methods to research how the datafication of domestic life is reshaping the European home in its aesthetic and legal space. The framework of the EU GDPR, AI Act and Data Act will be analysed based on some knowledges from environmental psychology, architectural phenomenology and ethics in AI. The research has focused on the interdisciplinary consideration of smart homes and digital traces within home spaces, but there still remains a marked absence in the literature. Both the reform of law and the aesthetic makeover of home are conventionally treated isolated one from each other, generating a partial view and an inadequate understanding of the house as a data and life space in literature. Moreover, ethics on manipulating emotions data, the limits of creative autonomy and algorithmic right to make decisions in the domestic sphere is an open issue discussed in literature. The focus and aim of the present research are to direct attention towards a number of select aspects beginning with the relationship and bonding between GDPR & AI Act and ethics of design, following with how personal aesthetics and emotions data shape the juridical new subjectivity that comes alive within people's lives and as well as ethics and aesthetic governance.

The present article takes a further step in advancing this debate by forming a conceptual framework that correlates EU data protection law, AI ethics and architectural aesthetics toward imagining an area of intelligent living spaces. The paper underlines the significance of home space in legal and aesthetic terms, where the activity of personalization has empowered both "the identity" of the home and its occupants and the concept of "aesthetic subjectivity under data governance", with reference to the AI interface aesthetizing emotional and cultural data on which juridical autonomy and privacy will rely upon.

3. Theoretical concepts - the home as a legal and aesthetic construct

3.1. From domestic space to data environment

The European environment within the home that is recognizable today, a distinct private domestic space, is really changing in visible ways towards an active digital environment which can sense, interpret and predict human behaviour. This move is motivated by the increasing deployment of Internet of Things (IoT) devices and large-scale sensor networks, ambient intelligence or machine learning-based infrastructures that constantly gather and process information produced during normal activities. In line with the literature regarding smart technologies and IoT, both in Gordon's edited collection as well official publications [1, 2, 3], we also need to be aware about the advantages of IoT that allows for everyday objects and urban infrastructure (where things and urban

infrastructure can talk to each other) merging our physical and virtual space for new possibilities of efficiency, economic value and improved quality of life. As to the smart city consisting of a smart environment and of its inhabitants using smart technologies, or partaking in communication networks so as to constitute the infrastructure for digital service provision, one could borrow from Hildebrandt, who studies "how ... technology reconstructs our world" by enabling functionality, notably predicting what we are going to do daily (core differences highlighted can be seen on these predictions, it's about preferences; it's related to credit risk, health etc.), among others notice at how law and legal institutions are present or exist and at both infrastructural changes modifying normativity as technologically reconstructed per GDPR, not technically neutral. This conceptualisation is structurally at odds to the foundations of EU data-protection doctrine, which assumes that legal protections are produced using text-based, interpretable and contestable norms [4]. As the infrastructural network expands, the home functions through interface as data streams flatten spatial boundaries previously producing everyday gestures, flipping light switches, adjusting temperature dials and selecting music, into machine-readable signals.

Legally speaking, the home is not just an area of privacy as it was traditionally viewed in terms of constitutional law; it becomes a *site of data production*, the home is now a digital environment in which data are generated and therefore regulated by European data protection laws. All the types of personal data created by residents such as their movements indoors, biometrics, emotional states, behavioural patterns, health conditions, and religious symbols through their home designs or sensors are classified as "personal data" under the GDPR. However, those same types of data when they are special categories of personal data (health attitudes, affective conditions, religious symbols), are afforded a higher level of protection. Further regulation of this type of high-risk domestic use of AI [5] is provided by the AI Act. For example, the AI Act provides for greater transparency, a risk assessment of high-risk AI systems, and accountability of the developer of the system. Overall, the European home is being increasingly governed by digital technologies and is becoming a micro-judicial space with rules governing the processing of resident's personal data (principles of lawfulness, fairness, transparency, purpose limitation, and privacy by design).

The increasing use of AI-facilitated personalisation tools is creating a conceptual shift whereby the home comes to possess qualities of the *data subject*. Legally speaking, the data subject continues to be human beings, but all data produced by sensors, appliances and smart infrastructures turns the home into a proxy for an individual identity: an exposé to dataveillance of habits, preferences, vulnerabilities and emotional rhythms. Zuboff's description of "surveillance capitalism" it offers the clarification we need to understand how places filled with data about behaviour become sites for extraction and prediction [6], even as it recognizes that this dynamic now pervades domestic space, where the material is typically presented as a exclusive surplus disposed through machine-intelligent systems producing 'prediction products' capable of anticipating what people will be doing in future timeframes. Therefore, smart living is a *spatialized subjectivity* for which the house functions as a creator and vehicle of informational identity, where architectural form

crosses paths with algorithmic logic, situating it as a techno-legal half-body whose status is no less determined by data governance than its built form.

3.2. Aesthetics of living and emotional design

Beneath its reconfiguration, the datafied home inaugurates a new aesthetics of home. When it comes to the concept of *aesthetics of living* the question is what exactly is this interaction of matter, sensuality, atmosphere and identity; a world that looks at the home as a space of expression through which individuals express and transmit what they think of themselves. In this respect Pallasmaa reflects that "architecture strengthens the existential experience, one's sense of being in the world, and this is essentially a strengthened experience of self. Instead of mere vision, or the five classical senses, architecture involves several realms of sensory experience which interact and fuse into each other" [7]. This observation is heightened in smart homes, where algorithmic atmospheres constantly adapt to emotional states and habits of occupation, through interior components housed under AI control such as lighting, soundscapes, colour schemes and temperature we can witness that aesthetic template of the home is not fixed but responsive.

This shift leads to the field of *emotional design* as described by Norman in which affect, cognition and interaction would be at the basis for a positive experience through interaction and whose successful design should not only focus on what is useful but also on one's emotional connections with objects, from immediate appreciation to personal significance over time since we interact with more than just material possessions; they hold personal meanings, help us to express who we are since we interact with more than just material possessions; they hold personal meanings, help us to express who we are [8]. In an AI-augmented home, intuitive design meets algorithmic interpretation creating algorithmic aesthetics where data processing leads to customization. This is how architecture is transformed into an emotional mirror system, recording preferences stored through behaviour tracking, sentiment analysis, and daily mood swings. Algorithms may also light a room to reduce stress, alter its acoustics to make it better suited for focused work, and even suggest new room layouts based on its patterns of mood. Such capabilities promise increased well-being but at the same time pose a number of new legal questions because, for instance, when aesthetic personalisation depends on sensitive data, design is no longer purely expressive but rather a tool for processing protected categories of information and thus a subject to GDPR obligations.

Algorithmic aesthetics also shifts the traditional architect, resident and environment relationship. Atmosphere is one such an idea in Zumthor's work that can help us understand how architectural spaces act on emotions, drawing from elements such as the relationship between materials, sound, temperature and light and focus in particular on a synthesis between interior exterior space [9], while digital environments amplify these effects through feedback. The home itself becomes a continuously changing space where identity, emotions and behaviour data intersect; this intersection however blurs the line separating aesthetic expression from information processing practices convincing some that contemporary architectural design practice must be reconsidered as an oscillating gesture of dynamic play between materiality on the one hand and the control of data on the other.

3.3. Ethical and psychological dimensions of space

The conversion of the home as legal-aesthetic data infrastructure is not only determined by technical forces, but it contains ethical and psychological aspects, since findings from *environmental psychology* show that certain spatial characteristics in residential environments influence affect regulation, well-being, cognitive performance as well as behaviour [10]. Smart home technologies exacerbate these issues by creating environments that accommodate user-centric principles of comfort and convenience, in turn creating a notion of digital well-being grounded in aspects of spatiality and personalised data-determined control. In Jaspal and G.M. Breakwell's book [11] and associated research literature [12], Proshansky's place-identity theory implies that home meanings are taken inside individuals, whereas if the meanings become manufactured via algorithmic means this conduit becomes hybridized and experience is tied to computationally mediated inference.

This is ethically interesting, in light of the understanding of the home as a site for human dignity, autonomy and relational flourishing in ethical home, which resonate with Floridi's conception about the two pillars approach to ethics of AI concepts [13]. In this sense, the ethical home must be based on smart technology into homes that enables customers to empower their privacy and autonomy, emotional sustainability and refuses behavioural profiling. The distinction between the supportive and the invasive becomes a very fine one, due to these well-meaning algorithmic technologies which exist in order to comfort but, at the same time they create conditions for addictions, up until diminishing our ability to decide, or even adding into its images of newborn sensitive feelings. Otherwise, as Crawford argues, the algorithmic automation raises issues of how we turn intimacies into sites of asymmetrical power [14].

From a legal perspective these problems intersect with the protection of private life (art. 7 and 8 of the Charter of Fundamental Rights of the EU) and relevant GDPR's principles to prevent "automated decisions having legal effects". This is why the AI Act strengthens these safeguards with a prohibition on AI practices which cause harm or manipulate human behaviour [5]. Ethical psychological reflection thus coincides with legal reasoning, and more exactly that the home should be an area of *informational self-determination*: people must continue to exercise substantial control of how their data affects their way of life. And these are to be balanced, required in a design space that demands architectural, technological and regulatory coordination as it opens out towards a governance model of privacy by design, emotional sustainability and spatial dignity.

The home can be seen as one of the primary sites to debate about autonomy in our increasingly digital lives, because it is here that algorithmic systems are reshaping how we see ourselves as legal subjects and act in this environment. Therefore, the smart home illustrates why an ethics of dwelling in the smart home will require balancing technological innovation with rights-protective measures; and shaping space in a way that supports dignity, aesthetics, and psychological well-being.

4. The legal architecture of the house as a data space

4.1. The GDPR as foundation-protection by design

Legal differences between private and public space are put in question by datafication as the home can no longer be only accessed physically and it can also be reached digitally. Legal understanding of privacy differs around the world, from individual rights to group privacy and contextual integrity; yet, all legal frameworks struggle to keep up with technological changes. Regulation is typically reactive, and enforcement difficult due to the distributed nature of data flow across jurisdictions [15, 16].

The protection of personal information and, following naturally from this, the house as a data space within Europe is legally conceptualised primarily in the form of The General Data Protection Regulation (GDPR), wherein such norms need to be interpreted within the structure of EU domestic AI ecosystems. The principles of the GDPR (lawfulness, fairness and transparency, purpose limitation, data minimisation) gain a fresh meaning when they refer to home atmospheres, behaviours and emotional states as sources of information. In the ambient intelligence scenarios, the legal processing is considerably harder as large amounts of data are collected passively by sensors, smart meters or presence detectors (proximity card readers) and also be put forward by algorithmic inferences. The conditions under which consent, even in its traditional intentional and informed understanding, is structurally endangered in the confusing interiors of the domestic are filled with consent as achieved under conditions of technological asymmetry or informational darkness.

The *transparency principle* encounters the same problems. Regarding the right of access in accordance with Article 15 GDPR, Hriscu's study also underlines that it may be impossible for this data subject to establish exactly who receives their data within an interlinked system as anyone qualifying as a 'recipient', extends beyond simply controllers and processors including then subcontractors and algorithmic cooperatives [17]. In the smart home, that invisibility is felt when it comes to residents having almost zero visibility as to when emotional cues (reads), voice recordings, behavioural patterns or environmental readings are harvested from them by makers of devices and AI services, and data brokers who are proving to be out of control access points for peoples' personally identifiable information.

The issue here is exacerbated by emotional data, which although not obviously special category data will often be so when it discloses health metrics, psychological states, religious influences and behavioural susceptibilities. The literature around emotional AI suggests that micro-expressions, tone of voice and physiological rhythms are supremely sensitive data points with profound implications for human dignity. It is doubted whether emotion-recognition can be in effect because of the cultural and situational diversity in facial emotional expression [18]. The GDPR is emotionally data-protective, with a focus on personal and sensitive data protection. Emotion data comprising information from facial expression, voice, body movement and other biometric or non-biometric sources are extremely sensitive because by its nature the emotion data is closely associated with one's internal state of mind or an individual identity. Biometric data is considered as "special category data" under GDPR [18] and entitles to certain substantial protections according to Article 9. However, emotional data is not a category of special data under Article 9

GDPR, it follows that emotions do not receive adequate legal protection [18]. The GDPR is concerned with personal data, which means any information relating to an identified or identifiable individual, and emotion data is not covered by this definition as far as its connection to specific individuals cannot be established; hence affective computing schemes that process physiological data might be subject to stronger regulatory limitations, while in principle visual-based systems do not deal with special categories of data [19]. Under the GDPR, processing of personal data (including emotion data) is subject to fairness, transparency and accuracy principles, but fairness is difficult to achieve in the presence of power imbalances, transparency obligations may fail to indicate what emotions are actually detected by an AC system and mere accurate interfere with their performance [19]. We must say that the AI Act is clear with respect to the applicability of emotion recognition systems. They fall under the high-risk AI systems category, and are subject to requirements relating to accuracy, transparency and human oversight. Use of AI systems for recognizing emotions also elicits several issues, specifically the risk for discriminatory decisions against subjects by ethnicity, gender or, in particular, age since emotion-recognition models are used which may consequently reinforce such biases [20]. The Digital Services Act (DSA) will bring new responsibilities for online platforms, in particular requirement to carry out risk assessments and transparency obligations on the use of emotion data in ads and recommendation systems [19]. In fact, although AI Act and DSA present certain regulations, they fail to address many ethical and legal implications of emotion data processing, such as user autonomy and informed consent [19]. Legal frameworks need to mature with the changing scenario of AI technologies to provide for sufficient protection of human rights. Therefore, smart-home tools for emotional inference should be situated within the Article 9 of GDPR scheme for higher protection. Some authors believe that non-anonymous emotion data ought to receive a unique form of legal protection in the context of GDPR, for moral in addition to privacy reasons, since this suggests more stringent rules concerning emotion detection technology ("We will argue that there are both indirect as well as direct reasons to include no anonymous emotion data in the group of so called "special categories" that deserve greater protection under the GDPR" [21]).

The GDPR's principle of purpose limitation is also hardly enforceable in the domestic environment, as data collected for one aim (ambient control) can quite simply be used for further ones like profiling, targeted recommendation or behavioural prediction. This is why the argument that reusing domestic data necessarily threatens to breach users' normative expectations *DPIA's* turn out to be powerful tools especially for local AI systems and the DPIA methodology raises the risk criteria including systematic monitoring, use of sensitive data, innovative technologies or assessment of people's feelings that are intrinsically embedded in smart living architectural designs. The obligation of a DPIA thus turns the home into a legally protected space within which risk assessment comes before architectural or technological implementation.

The principle of privacy by design gets an aesthetic and spatial translation, because law has to be designed into the material infrastructure of technology, and the smart home has to embed legal protection into its architectural form (spatial zoning governing minimum surveillance, strategies for placement sensors that respects intimacy, emotional modelling

systems that delete data as quickly as possible from memory storage and input output devices that render intelligible algorithmic processes). Privacy by design becomes both a mandate and an aesthetic practice that structures the constitution of subjectivity in domestic settings.

4.2. The AI Act - regulating environmental intelligence

The same way the GDPR sets down rules for the use of personal data the AI Act has established what the legal limits are for how the architecture of algorithms influence our home lives. It is clear through the evaluation of AI and its decision-making that it categorizes systems based on risk, with emotion recognition, biometric categorization and predictive algorithms classified as high risk if they are used in people's environments and could affect their rights or wellbeing. Therefore, smart home systems that would make use of lighting, climate or soundscape in ways like those above will have to comply to strict documentation requirements regarding product quality, data transparency, and human involvement in the process (Art. 9-15 AI Act).

One of the most innovative aspects of the AI Act is to require *architects, interior designers and system integrators to act as operators of AI systems*. In addition to the fact that the operational scope of domestic AI systems extends across functionally integrated sensor clusters, inference routines and interaction interfaces; architects and designers will now be held accountable for the explainability of their systems, as well as whether users can control them. The second dimension involves *prohibited AI practices*, where AI led (manipulative) exploitation of users' behaviour or systems that undermine users' autonomy could potentially occur as a result of some emotion adaptive technologies (in the case of over-intrusiveness via affective feedback loops or making predictions of user's decisions below their level of awareness, this could violate provisions of the Act prohibiting subliminal manipulation). From an ethical standpoint, they also are doing this because of the privacy versus AI issue, which highlights fairness, explanation, and algorithmic accountability as well as non-discrimination as key values or because of European views on trustworthy AI that support a human-centred approach. In home settings, algorithmic discrimination may be less obvious, as in the form of unbalanced comfort predictions, biased behavioural analyses or even wrong classifications of emotional states (since pseudonymized data can easily be reidentified in smaller, closed environments such as homes). We also have experience with the literature of the EU Urban Agenda, which shows us that any technology governance needs to be human centred and in a participatory way, which means that algorithmic systems should enable (not replace) human autonomy and decision-making [22].

4.3. The Data Act - a new market for domesticity?

Previous studies [23] have emphasized that citizens' data generated may be considered as a valuable commercial asset from which many different types of unfair profit can be derived. Furthermore, when smart homes are added to the equation, the risk of using behavioural logs, emotional data, environmental signals and consumption patterns to derive insights of high economic value for insurers, advertisers and platform operators increases even more. Also, there is a strong tendency of data-determined services to externalise data as commodities, that is, to sell them on shady secondary markets where

the original subject of the commodity (the user who produced the data) loses control over his personal information and therefore suffers from informational asymmetry that in turn undermines the possibility of true consent every time the data producer (the user/resident) has no bargaining power.

The Data Act tries to change this setup, giving the users of the devices greater rights on the data produced. However, as the studies about the right to access, the management of the recipients of the data and of the downstream flows of the data remains a difficult task in highly interconnected ecosystems [17]. This is where the theorization of data domesticity could elaborate further, pointing both to a normative prospective that domestic data should be considered as distinct category warranted in being treated differently given that it relates to identity, emotion, relationality and well-being and for which a rights-based approach to governance can work not just around barriers but also towards recognition that democratic accountability depends upon citizen centric design. In order to transform the data into domestic data, we need stricter safeguards for the emotional and behavioural data that is produced in our homes, restrictions on the secondary use of home-generated data, privacy and autonomy to be designed into the smart home devices, architecture and technology embed ethical analysis of law, aesthetics with a sensitivity to domestic environment in design experiences for home AI systems. We believe that the AI home should not be regarded as consumer-tech, but as an *extension of human identity* and it should cherish the same level of protection like the human body, private life and psychological integrity.

5. The aesthetic environment: design as a non-verbal portrait

5.1. From environmental psychology to smart living

The aesthetic layout of the home has traditionally functioned as a static representation projected according to the inhabitant's identity, a *non-verbal portrait* which is made up of spatial distributions, stylistic preferences and material textures [24]. In the smart living age such aesthetic dimension undergoes a substantial transformation, from a passive background to active data-driven actor [24]. Classic environmental psychology, for example, believed that place attachment is generated by the stability and customization of the physical environment [24]. However, IoT integration changes this relationship [24], and most modern aesthetic environment is determined not only by visual consistency but *responsiveness* smart homes [24]. The current intelligent home systems function as centralised control points that can turn lights, adjust temperature and manage audiovisual elements by generating flexible scenes which adapt to the user's presence [24]. This shift enables a novel type of aesthetic customization, the home no longer simply mirrors the identity of the inhabitant it is also profiling them [24, 25]. This dynamic adds another layer of complex "forming new behaviour system" to the realm of interior design. All sources of aesthetic rating, from light dimming settings for relaxation to automatic music choice, create data-points [24, 25]. These decisions were previously ephemeral; now they are recorded, inspected, and fed back into the system to improve its predictive algorithms [25]. As a result, the consumer's home is turned into an interface in use. The operating system communicates the users state to the system through behaviour, and then recommunicates back by changing settings; this raises ethical issues regarding privacy, as the cozy field of smart-room is in fact embedded in a persistent monitoring architecture

that can deducing intimate information about inhabitant lifestyle and characteristic from their "behavioural residue" [26, 27] that we call also digital footprint.

5.2. Affective computing and emotional intelligence

This trend of the smart home development is further advanced *affective computing*, a computational technology that can recognize, interpret and simulate human affect [28]. Here, the home is furnished with a sensorium of biometric devices (wearables, cameras and voice assistants) that are always-on measuring their residents' physiological and affective states [28]. These systems work with the hypothesis that human well-being could be enhanced by generating "restorative environments" [29]. For example, "emotion-sensing chairs" which are equipped with pressure sensors can sense stress according to the sitting posture and restlessness by adjusting their shape to relax users [30]. Moreover, an adaptive lighting system can adjust colour temperature and illuminance in real time for controlling circadian rhythm and affective state as a kind of external controller on user's internal state [31].

Yet this technical ability poses a deep conflict between *artificial empathy* and *affective autonomy* [32, 33]. *Artificial Empathy* means the system simulates perception and response to feelings [32]. The smart home may seem caring when it dims lights for a stressed user, although it doesn't care anymore than its emotion processing capability does. *Affective autonomy* is the human ability to manage one's own emotion and determine emotional boundaries for themselves [33]. However, outsourcing this autonomy to the built environment for emotional regulation purposes could be its killer [34]. And because the home continually intervenes and repairs a negative experience, it is possible that users will learn to rely on technological scaffolding for emotional regulation and lower their resilience, however [33, 34]. Also, devoting that kind of intimate emotional data has very grave threats to the mental privacy, for users might not realize that in their home someone is reading their non-verbal information [35].

5.3. Embodied empathy and the biometric feedback loop

The synthesis of these technologies finds its expression in the notion of *Embodied Empathy*, a theme that is central to the work of Mona Ghandi et al [36]. This thesis argues that architecture has the potential to not only be a shelter, but an empathic partner due to a closed cybernetic loop referred to as the *Biometric Feedback Loop* [36]. According to Ghandi, "Embodied Empathy" is experienced when the physical environment becomes an extension of human mind and body [32]. The process is as follows: *sensing* (the device records bio-signals such as heart rate, brainwaves by means of EEG, galvanic skin response from the user) [32, 36], *processing* (AI's interpret the data and generate an estimate of emotional states for the user) [32, 36], *actuation* (system iteratively and physically reconfigures its physical or atmospheric architecture; changing colour of walls/increasing volume or change acoustics, to mimic or counter-balance a user's affect) [32, 36]. This gives rise to a cyber-physical emotive space that blurs the distinction between inhabitant and habitat [32]. Home has a second skin, which breathes and feels the user [32, 36]. But such radical connectivity is also the pinnacle of self-commodification [36]. As Shoshana Zuboff suggests, these are systems which takes

human experience including the deepest recesses of its interior feelings as free raw materials to be translated into behavioural data Incoming [37].

The *Biometric Feedback Loop* has a dual perspective, an aesthetic of perfect comfort and understanding, whilst also acting as a form of control [37]. Through making the immaterial emotion visible (data), the smart home passes on the "Forum Internum", a privacy literature as the holy of holies of human consciousness, to external review and treatment by algorithm procedures that contemporary law, via recent acts such as the EU AI Act, will now regulate heavily [35, 38].

6. The architect as ethical curator

6.1. Creative freedom versus data ethics

It also offers a difficult area for the architects and the designers to well balance their aesthetic new creations with the legal issues associated with the processing of the sensitive data [39]. The irony is that in the expanding and developing practices of the dynamic technologies it's a line between creative freedom to transgressive design, beside healthy aesthetic limits with protective moral knots weaved around the sensitive personal or context-historical data in architectural projects [39]. The responsibility of the issue is the observance of the ethics and the rules for the utilization of the data, in a manner that the design process will not transgress the human rights and the data utilization [39].

The issue emerges out for the domestic intelligent environment, in which the form innovation design emerges from the user data with the purpose of personalization [40], taking into consideration the creative freedom and data ethics in the design for architects. The designers then initiate the design process with the starting point of form and feature design approximation, which is then expanded further through other materials in the design of policies in design spaces to address the issue of form innovation in accordance with the dominant form of legality (form compliance, GDPR data minimization, privacy) for the prevention of unauthorized surveillance in a way of not breaking ethics [40, 41]. The issue of lack of neutrality in AI design might make the designers accountable for unanticipated bias and loss of privacy because of unanticipated AI design, where the inability to perform the function might make the architects vulnerable because of the responsibility in legal and ethics issues that they are reasons and not humans in the domain of privacy and ethics [41, 42].

The biggest issues are a trade-off between transparency design algorithm and too much IP release, and too much opacity, which can be liftable but ethically awkward, according to personal communication [43]. The Romanian perspectives characterize the predictive design as increasing human freedoms based upon efficiency but also limiting freedoms through constant monitoring [43]: *aesthetic design risks* involve the testing of real-time data streams and information, that profiles citizens against privacy and antidiscrimination laws inadvertently [42, 44]; *burdens of regulations* - while for high-risk designs, a requirement of the EU AI Act is that the individual must perform a variety kinds of risk assessment; *diminishing creativity* [42, 44], and *moral imperatives* - first in giving human dignity accomplished through ethical review ideations, creating designs that enhance versus exploit user data [45, 44].

It appears a way out of the conflicted space concerning artistic liberties and data ethics in smart house architecture is to consider privacy by design and trustworthy AI in architecture from the inception, and then everything will be compliant with the treatment.

6.2. From aesthetics to accountability

The architects have gained an ethicised dimension within their mediatory process between laws and technologies of the becoming and users experience [44]. The area has evolved to the point where we can add to it today, that is, the rules of "trustworthy artificial intelligence" and of "human-centred design" in residential architecture, and drive design that will uphold the trust and cooperation of the users, and uphold the legal constraints [44, 46]. The growing professionalism in the area of residential architecture implies a new duty regarding the responsibility to provide an ethical concern for architecture [46]. This means that in the coming years, in the design process, architects will design not only modern and aesthetically pleasing homes, but homes that will take into consideration the users' rights concerning privacy, transparency, and the responsible use of technology [47], that is why architects are going to be more responsible and ethically regarding the built environment.

Despite the problems associated with the levels of intensity and variation in meanings ranging from ethics to legal obligations, the latter finds a sense of confluence with aesthetic in the ideologies of transparency and governance [48]. Coming to the architecture designs in the smart homes, the designer has to implement the privacy by design treatment in fulfilling the obligations to the GDPR in terms of the design and treatment of the developments and data through the utilization of users' consent and minimization [48, 49]. In the new emerging trends, there will be a sense of accountability reflected in architecture in terms of the decisions and actions influenced by IoT architecture and their recording in the transparent form of storage in terms of auditing if the treatment has been undertaking in an ethical way [39, 46].

The ethics curator model puts architects somewhere in between static laws (EU AI Act), moving target technologies (use of AI personalization), and seamless front ends [46, 49]. Ethical assessment of impacts will be established in the domain of early-stage schematic design, where future-oriented technologies (adaptive lighting) are measured against the potential risks of future-oriented harms of surveillance [46, 48]. Integrating with data ethics and legal aspects will facilitate the design of solutions to the conflict by architects themselves, based upon quality of compliance audit trust [48, 49]. By adding AI trustworthiness to human-oriented design, the domestic housing sector focuses instead upon "user intention" rather than optimization [50].

Consent interfaces and bias audits are employed to make the system more inclusive, and this is especially the case for vulnerable users such as the elderly in privacy-preserving non-intrusive monitoring, thus enabling them to cultivate elect management [50, 51]. All this human-centred design results in homes that gently lean and conscientiously scoop and evolve their interfaces for users who are neurodivergent without the need to invade and increase viscosity and architecture higher up in the ethics hierarchies [48, 49].

7. Findings and discussion

Datafication processes facilitate the transformation of domestic aesthetics from a concern for shelter to a space where the issues of identity, atmosphere, and regulation interact.

Firstly, the aesthetic of domestic living has also come to be recreated through the progressions of codification, where data-driven representations of users' identities and their use of the home are created. The home is an environment, and consequently, it has a number of architectural dimensions (lighting qualities, sound and space qualities), and these qualities are determined by, and determine, the user's preferences and emotional condition, and this, in turn, is expressed in environmental terms. The aesthetic dimensions of the home user's living style are inextricably linked to the home user's information practice, and its aesthetic properties are computationally determined expressions of the practices. The codification of the home and environment relies upon the processing of large numbers of personal/sensitive data that are governed by laws and rules designed to guard privacy and security demands regarding homes and their users. The home is also becoming an environment of aesthetic experience where it is managed through the regime of compliance, risk, and accountability.

Secondly, emotional data occupy a particularly determined space in relation to the connection between law and aesthetic experience. For a long period of time, emotions were known to be temporary occurrences in the realm of affective experience. At present, emotions produce traces that serve for the optimization of domestic life through the adjustment of the algorithm in use to make the most of emotional data. Emotional traces refer to users' preferences, attitudes, and beliefs, but they also remind designers that while aesthetics is the centre of design, mood, preference, and comfort are deliberately expressed and explored. Emotional data are, through their presence in the intersection of the subjective and the juridical, both a part of the manifestation of the self and a target of legal rules. This means that emotions are no longer experienced in the realm of the phenomenal but in the realm of the normative, taking into consideration consent and the prohibition of automated decision-making processes. The complementarity of the two functions gives rise to the problem of opacity and autonomy because the systems produce emotional states and adapt to them, but they also produce dependencies and make invisible profiles according to the traces and emotional life, opaque to consciousness because aesthetic experience and legal experience coexist.

Thirdly, there is a structural conflict between the aesthetic freedoms of designers and architects, the data protection obligations of the GDPR, and the economic rationalities of data markets. Designers and architects usually enjoyed the strongest freedoms in creating aesthetic environments for their users. They are now, however, forced to follow to binding normative frameworks in light of the GDPR obligations of minimization, purpose limitation, and fairness. The Data Act has introduced the mandatory need to share and make available data for market reuse. We are urged to commodify our domestic practices and our emotional data. The smart home thereby marks a battleground upon which the aesthetic research of designers and architects is matched against the judicial safety of the residents and the economic interests of the data extractors. The fact that traditionally the home has been conceptualized as a privacy space and is currently understood to be a space

of technology that carries a massive value in information terms adds to the conflict and marks a clear asymmetry in the relations of the residents to the technology in their homes that aims to increase their comfort. The struggles between the designers and architects and the residents thereby illustrate a deep structural conflict between the aesthetic qualities of domestic architecture and the restrictive constraints that are needed in order to safeguard our most personal data.

The results of this article offer the proof of a conceptual conjunction of a juridical aesthetic to a *legal aesthetic project* wherein the domestic space appears as a space that is both embodied and disembodied in form and function in terms of affectivity and regulation. The smart homes foster aesthetic subjectivities that emerge not only from sensory perceptions but also from the legal aspects of gathering, inference, and the retention of the data. The home is also turning into a juridical climate where transparency, accountability, and informational dignity offer the space to think through the aesthetic of the home in terms of the fact that the aesthetic is not only an external factor but has a way of inhabiting us through the call of media technology.

With this in mind, the current research proposes the need for the construction of an *Ethical Aesthetic Governance Framework* with four pillars. The first pillar refers to *Legal Compliance* and suggests the need to include the rules and regulations of GDPR and the AI Act within environmental and architectural processes in order for the technologies of personalization to function within well-defined normative frameworks. The second refers to *Emotional Transparency* and demands the need for algorithmic systems to process and make sense of emotional data in a manner that is transparent, understandable, and contestable. The other two pillars refer to the *Aesthetic Accountability* and suggest the need to consider design as a form of ethics and morality in the sense that architecture and ambient designs please users in terms of the mind-body complex and information security. The last one, *Data Dignity* - in the sense that domestic space is an ethical space where the emotional integrity of data should be maintained and the doom models should not be treating the citizens' data as its quasi-kin.

The urban data and the digitally enabled architectural practices are never neutral, but instead, they are an expression of the political, social, and economic structure of power [52]. Through the increasing implementation of ICT systems in the construction of smart cities, data collection and interpretation form the basis of how the urban and domestic space has to be designed and managed [52]. The implication of this development is that the spaces that human life occupies are dependent on digital architecture, whose effect goes beyond efficiency [52].

8. Conclusions

The importance of the research lies in how the domestic datafication and that it becomes a space with a dual function, aesthetic and legal, where emotion expression, space and governance become woven into one another. Because the smart-home technologies respond to behaviours, preferences and emotional expressions in essence, and the home is a site of aesthetic codification. The more saturated by data the environment is, "the safeguards

of the individual in the environ transition from physical or territorial ones to juridical ones related to use of data, surveillance, and algorithmic functioning" [53].

However, aesthetic experiences at home cannot be conceptually separated from legal risk and exposure; they are mutually constitutive features of one another as much as data protection principles such as transparency and minimisation.

The findings indicate that both responsible-aesthetic and legal dimensions of smart living should to be conceptualized in a complex related manner and although this is far from exhaustive approach with regard to the design of smart environments that are sensitive to human identity and basic rights safeguarded in many cases under personal data handling perspective, *Ethical Aesthetical Governance Framework* provides an illustrative and possible example for how emotional transparency, aesthetic accountability along data dignity can be valued.

The merging of human activity with digital infrastructures, which will mould, and distort all present-day built environments, including the home, into a hybrid machine environment that needs to be secured and anticipated anew [54]. In this new home environment, a model of security will be based less on managing the digital intrusion and more on recognising at the existential level just how pervasively and intimately embedded existing levels of technology are in personal and domestic space, as well as the emergence of a system that can cope with such deeply entrenched presence [54]. The required modern urban space will inevitably depend on a digital platform as an enabling structure of thought (intelligent platforms and data driven engagement strategies) to support and enhance the above-described process [55].

The term "smart home" is thereby transformed into a legal-affective space, in which the data are the intermediaries of an expression that obeys legal rule, life and affectivity being assigned a value and information. The architectural space is therefore taken under the power of rule of law and has an effect on how people live, perceive and use their places [56]. The current domestic space therefore becomes a designed aesthetic space and an eco-regulated space according to the social requirements of sustainability and well-being [56].

Resituating affective ethics within architectural and design studies would also stimulate the arise of a new skill set with which to address data-driven domestic space. Inquiries into the role of aesthetic subjectivity and data governance in modelling architectural space, will lengthen their reach to the public domain, including as with the previous investigation to that of smart city.

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