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Dissertation review

Author: Foteini Kolaiti

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Born: 1990, Athens, Greece

Title: 3D printed sanitary hardware for speculative needs, functional fictions of minimized waste of water in a sustainable Martian bathroom

University: The Eugeniusz Geppert Academy of Art and Design in Wrocław

Field: Doctoral thesis in the field of Arts in the discipline of Fine Arts and Art Conservation

The thesis falls within the field of speculative design and takes as its context human habitation on Mars. The aim is not to propose objects for a real Martian colony project, but to use this scenario to examine issues related to the environmental crisis. All of the proposed prototypes are the result of a design process whose methods of conception and manufacture are themselves questioned by the thesis in light of the scarcity of resources and the requirement for sustainable and autonomous production induced by the speculative Martian setting, while remaining directly relevant to the terrestrial context. The project encourages users to modify their daily habits through transformative objects that influence their behaviour. The scenario focuses on hygiene habits and practices, but can be extended to all domestic habits and practices by extension.

The methodology emphasises a strong multidisciplinary collaborative dimension between scientists, engineers and designers. The research is based on scientific experiments conducted with the assistance of engineers and specialists, which have made it possible to assess the scientific viability and feasibility of the proposed prototypes. The link between technology and craftsmanship, which is at the heart of the approach, also shapes the profile of a speculative inhabitant at the centre of the fictional project. The figure of this inhabitant, who is no longer a simple user but becomes a craftsman, a maker, an engineer and even a designer, is central. The project places the principles of sustainability, simplicity and recyclability at the heart of everyday objects. On the one hand, through their use, which saves resources and transforms waste into new reusable resources, and on the other hand, through

their manufacturing methods. The project thus shifts the discourse and injunctions of sobriety towards a scenario of concrete, lived experience linked to everyday and intimate objects and gestures.

The project presents 3D printing as a technology that enables individual production using local material resources, in this case, in the context of Martian fiction, clays found at the sites where habitats would be built. Additive manufacturing is therefore seen as a transformative manufacturing method capable of solving production issues in a constrained environment, both at the scale of object design, as demonstrated by the prototypes in the thesis project, and at the scale of interior design and architecture, as evidenced by other projects developed by Foteini Kolaiti. In this respect, her approach is fully in line with contemporary fields of design research, drawing on the convergence between traditional craftsmanship related to materials and emerging technologies such as additive manufacturing and robotics. Thus, on Mars and by extension on Earth, additive manufacturing could become an ordinary everyday activity in response to extreme environmental constraints. The Martian inhabitant-artisan-engineer is used as a model to demonstrate the need to consider the productive independence that additive manufacturing makes possible.

In this context, the materials used in the thesis are crucial to the overall relevance of the project. Ceramics, which have been used in domestic, architectural and technical applications since the dawn of humanity, become a strategic medium at the intersection of traditional craftsmanship and innovative technologies. Indeed, porcelain and ceramic recipes, firing methods and glazing qualities have been adapted to the requirements of each prototype, both in terms of their specific uses and their aesthetic dimensions. Combined with the formal specificities of additive manufacturing, the project's extensive expertise in the material, mobilised in the development of prototypes, has resulted in the creation of a unique aesthetic that contributes to the project's ability to capture the viewer's imagination and thereby generate questions, projections and reflections related to the principles of sustainability, re-use and recycling that the thesis advocates.

The project consists of a collection of objects designed as supports for fiction, not based on commercial logic, but on critical logic. Nevertheless, they serve very concrete purposes and

their design draws on methodologies specific to object design. Each of these prototypes addresses a specific issue related to limitation of waste production, sobriety, recyclability or sustainability in everyday life, in the little-explored context of personal hygiene and washing. Thus, unlike many speculative design projects that remain at the level of discourse, the thesis engages in questioning and operational demonstration.

The "Crateri Dentales" kit consists of three elements related to oral hygiene: a cup that limits the amount of water used to rinse the mouth, a spittoon that allows the water spitted to be stored and reused, and printed, edible toothpaste tablets that aim to improve the quality of this water for later use. The "Crematorial Toilet" prototype eliminates the need for water to flush sanitary waste, drastically reducing both water consumption and the logistical complexity of sanitary waste treatment, making it an object with strong transformative potential. Finally, the Residual Sink, a smart washbasin, incorporates a real-time visualisation system for the volume of water used to alert the user with coloured visual signals diffused in translucent porcelain modules. The material becomes both a functional support and a mediator, making visible, through its material qualities, usually invisible flows. This object falls within the field of data design, where a body of data is physicalised in the materiality of an object. Here, this process is mobilised to initiate a transformation in usage through immediate awareness of its environmental impact.

Finally, a VR environment extends the narrative to an immersive experience featuring the collection of prototypes in a habitat offering a glimpse of the Martian environment. This object is an attempt to offer a different experience of the fictional narrative, similar to mediation, by operating as a usage simulator. It is difficult to measure its scope and efficiency.

Overall assessment

The thesis is relevant: it proposes a reclassification of the bathroom as a place for critical and practical questioning of issues related to the environmental crisis through the use of design and material innovation motivated by the imperatives of durability, sustainability, recyclability and limitation of waste production. The choice of the bathroom is original, shifting ecology to a sector that is usually absent from design research.

The methodology is coherent. It combines academic research, multidisciplinary experimentation, technical feasibility studies and artistic production in the context of speculative narration. The use of space as a framework for fiction allows for a fertile shift that serves the argument.

The manuscript demonstrates a good understanding of contemporary issues and a clear articulation between hypotheses, implementation and analysis. It demonstrates the coherence and relevance of the artistic production.

The thesis succeeds in going beyond the often purely discursive register of speculative design through a genuine experimental commitment and high-quality production. The artistic scope is evident, as is the critical scope. The project opens up avenues for future work on domestic infrastructure in the context of scarcity.

After analysing her dissertation, evaluating its implementation, and considering the artistic production presented, I highly recommend that Foteini Kolaiti be an academic Ph.D. title in the field of art, in the discipline of fine arts and art conservation, with the distinction of Honorable Mention, in recognition of the originality, artistic, and critical significance of her work.

Orléans, le 18 février 2026,

Caroline Zahnd

A handwritten signature in black ink, consisting of a stylized 'C' followed by a long horizontal stroke and a final flourish.

