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Cur. Tom Kovac, Alessandro Melis

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Space-Architecture-Space

A Rare and Reciprocal Relationship

Space and architecture are inextricably linked. Space (1.0, terrestrial) is a fundamental constituent, and goal, of architecture – a long-established discipline that has an inherent and thorough understanding of human inhabitation on this planet. Architecture is equally paramount to space (2.0, extra-terrestrial) as humans cannot live and survive off-world without an adequately designed environment.

Space-Architecture-Space is a transdisciplinary and inclusive research project, encompassing the sciences, the arts, and the humanities. It investigates how architecture and space influence and advance each other. On the one hand, it endeavours to further terrestrial, lunar, and cislunar programs bringing together architecture, urbanism, industrial design, and interaction design with social sciences, health and life sciences, space and climate physics, astrophysics, and instrument science. On the other hand, our goal is to propose, in tune with the main ambitions of the CityX Venice programme, innovative design responses and solutions for, as well as provoke paradigm-shifting thinking about, the future of space programmes, and around the future of human habitats on Earth and off-world.

In fact, once a highly sophisticated machine and/or interplanetary vessel turns into a home, or even an emblem of human civilisation on another planet, a paradigm shift suddenly occurs. One from purely technical, rational, and scientific parameters towards design intuition, soft skills, and the unquantifiable variables of spatial, architectural design. The project hence examines how architects can provide insight and expertise, on various scales, on the experience of non-gravitational interiors in the micro scale, on the design of VR, AR and XR environments to transcend physical spatial constraints and long-distance relationships in the meso scale, and on the education of the cultural relevance of human extra-terrestrial colonisation in the macro scale.

To the Stars and Back

How can architecture and space influence and advance each other? By investigating the Space-Architecture-Space relationship in two ways, and in three different scales:

1) Downstream (i.e., space >> architecture)

Space can deliver knowhow, technological innovation, and progress: a) in the micro scale for P2P comms, for agile, responsive, and performative materials, and building systems; b) in the meso scale for system autonomy (air/water recycling) and for clean renewable energy (solar, rectenna farms); and c) in the macro scale for EOS (Earth Observation from Space) and PNT (Position, Navigation and Timing) data for smarter cities and better management of traffic, infrastructures, mobility, weather, food etc.

2) Upstream (i.e., architecture >> space)

Architecture can provide expertise in applicability and visions: a) in the micro scale for designing, building, delivering, and maintaining innovative agile and responsive building components and systems, rapid-prototypeable locally resourced (and/or bio-tech) material systems, and other in-situ yet remote, robotic fabrication strategies; b) in the meso scale for providing orbital/planetary, non-gravitational/gravitational, scientific/touristic ground and space systems designs; advising on potential psychological issues related to spatial constraints, remoteness, isolation, homesickness, self-reliance, training; educating astronauts on on-site co-living policies and social inclusion; and c) in the macro

scale by outlining and advising on space policies related to the creation of off-world living environments, including new approaches to organisational networking and international collaboration.

It's All About Space

Marjan Colletti's own research investigates space as one of the most profound constituents of architecture. He two-dimensionally, twoandahalf-dimensionally, three-dimensionally, threeandahalf-dimensionally and four-dimensionally draws, models, and fabricates abstract, yet immersive, space-architectures. Here, space is not empty, but dense, full of forms and formations; it is about light and shadows, colours and blurs, order and mess. Architecture, free (almost) from any 'terrestrial' constraints, can become an artificial environment of coagulated pixels, of fragile lines, and agile vectors. However, despite its abstract nature, such enquiry might raise some pertinent and specific questions about human cognition, sensory perception, and spatial awareness in particular situations that contradict gravity, challenge cartesian geometries, and oppose familiar geophysics.

In order to discuss Space-Architecture-Space with a higher degree of specificity, five groups of researchers from UCL were invited to contribute with their own research and their students' projects. Each team presents a particular, and focussed response to the brief:

Run by Marjan Colletti and Javier Ruiz, PG20 is one of the most long running and successful design units of the Architecture MArch at The Bartlett School of Architecture (since the late 1990s). 3D spatial thinking, modelling, and fabricating, mixed with 4D spatial, immersive, and cinematographic experiences lie at the core of the most recent production. Developed as part of the brief 'Out of: hand, mind, context, print, nowhere, Eden, breath, date, jurisdiction, love, reach, sync, touch, order, office, season, use, the box, bounds, focus, key, nothing, remit, time, place, control, sight, the blue, service, phase, curiosity, hours, line, question, range, here...' students were asked to change and evolve their architectural understanding 'out of' their comfort zone. Here, Tzu Jung Huang, Ivy Ziyu Jiang, Levent Ozruh, Theo Tamvakis, and Hsin Fang Tsai present their visionary space-architecture projects, based on data and engineering facts, mixed with a slightly stretched imagination – yet within the limits of feasibility.

Students who have a particular interest in planning future habitats that are shaped by biotechnology, data-driven technologies, socio-cultural dynamics, and exposure to climate change can do so with Marcos Cruz and Brenda Parker. Their Bio-integrated Design (Bio-ID) agenda takes these life-changing phenomena and merges architecture wide a range of expertise fields, including biology, multifunctional composites and fabrication, ecosystems, and space to lay the foundations for radically new, sophisticated, yet also critical design solutions that help to develop our built environment. The design of nature plays a central role that goes beyond being a simple environmental regulator, model, or inspiration; it is in itself the medium of a multi-layered design approach that is biologically, materially, and socially integrated. (students names??)

RC14 of the Urban Design programme, run by Roberto Bottazzi and Tasos Varoudis, explores the future of public spaces and speculates how environmental issues, non-human actors, and computational technologies will shape our perception, experience, and inhabitation of cities. Big Data and Machine Learning algorithms enable the automation and expansion of the scope of design, connecting disparate scales ranging from that of the planet to the local while maintaining precision and granularity. (students names??) Then large urban spaces are also experienced by small children, too, and should be designed accordingly. Architect and urbanist Enriqueta Llabres-Valls' project Le Fanu Skate and Play Park implements an interactive design toolkit developed in RC18 to propose a scheme centred on understanding spatial and material preferences among children, and to deliver a project that celebrates diversity, a sense of belonging, solidarity, and the capacity of cooperation.

Space psychologist Iya Whiteley reflects on a different rapport between nature, data, and architecture, since when on Earth, astronauts dream of space, and when in space, astronauts dream of Earth. They start listening to music, and the longer they stay in space, the more they long for Earth sounds. In Earth Sound Alphabet she identifies how architectural, immersive designs for multisensory experiences could reduce sensory isolation. It is known that sensory deprivation occurs during long-duration space mission, which will be a regular occurrence in the future. Listening and seeing the Earth's sonic alphabet, from crickets to frogs to birds, would be a way to extend human presence on other celestial bodies and off-world. Alan Smith XXX

Students of Ruairi Glynn and Fiona Zisch in the Design for Performance & Interaction MArch address the human factor too. They work with interactive technologies to consider objects, space, people, and systems as potential performers. The projects Vital Morphons, The Playground, MetaSensorium, Inhibition, and Counterproductive (by students names??) are informed by multidisciplinary theories taken from performing arts, digital media, spatial interaction, anthropology, sociology, cybernetics,

cognitive neuroscience and aesthetics, feminist practices, new materialistic entanglements of Haraway or Barad, as well as the concept of Heterotopias. The designs are phygital (bridge the gap between the physical and the digital), phytual (bridge the gap between the physical and the virtual); they speculate on the ability of wearable technology to create new levels of connection between people, and/or photosynthetic beings, but challenging the bias of AI algorithms.

A Place for Architecture

Envisioned as a truly transdisciplinary and inclusive project, ranging from art to science, anthropology to technology, psychology to science, aesthetics to ethics, Space-Architecture-Space puts architecture as an art-science hybrid discipline into the spotlight. It endeavours to evaluate how and how much it can contribute to space exploration, and how and how much it can learn from it in return, to improve the built environment on Earth.

Space 1.0 (terrestrial) and space 2.0 (extra-terrestrial) are therefore similar as being architecture's immaterial subject matter but defined by different criteria and environmental conditions. Equally, we could potentially draw a clear distinction between terrestrial and extra-terrestrial architecture: the first being the result of a disciplinary, historical evolution, the latter as a future-looking, transdisciplinary project with enormous challenges, but also opportunities.

As the different approaches described above confirm, in a rare and reciprocal relationship, space and architecture can tremendously influence and advance each other, to improve human life here on Earth and elsewhere. Architecture should have a place in space.

Prof. Dr. Marjan Colletti, Javier Ruiz (Architecture MArch PG20)

Prof. Dr. Alan Smith, Dr. Iya Whiteley (UCL Space Domain/Space & Climate Physics/Architecture MPhil/PhD)

Prof. Dr. Marcos Cruz, Dr. Brenda Parker (Bio-Integrated Design (Bio-ID) MArch/MSc)

Roberto Bottazzi, Enriqueta Llabres-Valls, Dr. Tasos Varoudis (Urban Design MArch)

Dr. Ruairi Glynn, Dr. Fiona Zisch (Design for Performance & Interaction MArch/Experimental Psychology)