ARCHITECTURE|S OF LOGIC

ARCH 7104 Graduate Diploma Studio | Spring 2021 | Prof. Dr. Dimitris Papanikolaou | dpapanik@uncc.edu | https://urbansynergeticslab.net

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"In the most general sense, computation is the process of storing, transmitting, and transforming information from one form to another" (Santa Fe Institute).

PREMISE
Since the early days of computing in the 1960s, two intertwined philosophical directions dominate the discourse on the relationship between architecture and computation, in design, theory, and practice. The first direction, coming from design studies, inquires design as a cognitive activity, asking the question "is design logic explainable and, as such, is it computable?" The second direction, coming from cybernetics, automata theory, and human-computer interaction, inquires architecture as a physical product, asking the question "is architecture's interaction with its environment explainable and, as such, is it computable?" [1] While the first direction has developed a critical theoretical foundation within architecture (from Shape Grammars to Computer-Aided Design) [2], [3], the second direction has not. Today, 40 years after the MIT Architecture Machine Group created the Media Room [4], we still append technological gimmicks to architecture as an afterthought, and we still point and talk to buildings, walls, and furniture as if they have mind, soul, and internal composure, without critically inquiring the boundary between what is digital and what is physical; between what is information and what is matter.

There are two reasons, one could argue, for this lack of critical perspective. The first is that electric voltage, the medium with which information and computation are manifested digitally, is both invisible and imperceptibly fast, and as such, its architectural expression is practically impossible. The second reason is that the actual workings of computation, the mechanisms with which inputs turn into outputs, are of no importance to architects, and as such, their architectural expression is unnecessary or even pointless. Both points are results of a digital illiteracy and of a culture that prioritizes the ends over the means. As such, they are subject to critique.

The premise of the studio is that, in an era in which, the transition from the internet of bits to the internet of things increasingly dissolves the boundary between the digital and the physical [5], and in which, the increasing distribution of control and resources turn the environment into a negotiation medium, the ontological distinctions between what is a building and what is a computer, and between what is information and what is matter, become a major architectural statement. Just as Modernism gave form to machine functionality, so today, a Second Modernism must give form to computational logic and social synergy [6].

Taught online, the graduate diploma studio will explore the design, modeling, and analysis, of intelligent architectural, urban or territorial ecosystems as well as their cyclic or acyclic transitions in time, asking the question: how do we design intelligent architectures across technologies and scales? Inspired by Santa Fe Institute's quote that "in the most general sense, computation is the process of storing, transmitting, and transforming information from one form to another," and by information's etymological definition, as "the process of giving form to communicate knowledge," the studio will seek novel ways in which form, transformation, and materiality can become expressive media to inform, compute, communicate, and coordinate meaning architecturally, in addition to, or instead of, digitally.

METHOD
The studio focuses on key concepts of 1) **systems-thinking**, such as structure, information feedback, and dynamics, 2) **computing**, such as logic gates and logic circuit, and 3) **social organization**, such as commons, swarms, sharing, and cooperation, and it explores their application in architecture, through typological studies, mapping diagrams, and physical or computer simulations. The studio explores this topic in three levels: components, organizations, and behaviors. In the first level, students develop a typology of components, logic rules, and basic interactions. In the second level, students study how their components can arrange into larger organization patterns. In the third level, students study, document, and represent how their systems behave in time, assessing their potential to adapt and self-organize.

TOPIC
A territorial-scale site and context will be given. Students are responsible of choosing their project's specific site, defining the program and type of building based on their investigation, and positioning them through the lens of the studio's premise.

OBJECTIVES
- Implement systems thinking in design and integrate physical or digital simulation methods into design
- Develop a strong thesis statement and be able to position it critically within the architecture/technology discourse
- Work independently by cultivating a learning-through-making approach to design, and become comfortable working within unknown fields of knowledge
- Think out of the box and challenge pre-established notions about design, technology, and materiality

APPLICATION
To apply, send a short statement to dpapanik@uncc.edu summarizing your motivation, strengths, and expectations, in relation to the studio.

REFERENCES (ADDITIONAL READINGS WILL BE DISTRIBUTED IN STUDIO)
[1] N. Negroponte, *The Architecture Machine: Toward a More Human Environment*. The MIT Press, 1973.
[2] G. Stiny and J. Gips, "Shape Grammars and the Generative Specification of Painting and Sculpture," *Inf. Process.*, vol. 71, pp. 1460–1465, 1972.
[3] W. J. (William J. Mitchell, *The logic of architecture: design, computation, and cognition*. Cambridge, Mass., 1989.
[4] R. A. Bolt, "'Put-that-there': Voice and gesture at the graphics interface," *ACM SIGGRAPH Comput. Graph.*, vol. 14, no. 3, pp. 262–270, 1980, doi: 10.1145/965105.807503.
[5] M. Weiser, "The Computer for the 21st Century," *Sci. Am.*, vol. 265, no. 3, p. ec, 1991.
[6] Arindam Dutta, *A Second Modernism: MIT, Architecture, and the "Techno-Social" Moment by Arindam Dutta*. MIT Press, 1616.