

**AIA Corporate Architects and Facility Management Scholarship 2015**

*Personal Essay Topic 2: What trends are you seeing and/or being in taught in your architecture program that you believe will come to fruition in your professional career?*

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**Multi-dimensional Buildings, Thermodynamic Depth,  
and an Agenda for Powerful Architecture**

I am completely absorbed; I *need* to design buildings. Complicated, multi-layered, performative, contextual, interesting buildings. As a total discipline, architecture intersects so heavily with culture, politics, history, art, ecology, and technology that insular design thinking is not an option. With my diverse undergraduate background in civil engineering and fine art--as both a researcher and a creator--I have never been satisfied with a singular approach to solve a problem or a narrow lens through which to see the world. Load calculations are as informative as oil paintings. Design is never static, and the parameters are limitless. There is always more knowledge to attain and deeper territory to traverse, whether in theory or thermodynamics. As an intellectual project, architecture possesses an absorptive totality that requires me to fill an expansive toolbox. This is why I am pursuing a Master in Architecture from Harvard University's Graduate School of Design.

Within the curriculum at the design school at Harvard, the strongest trend in the pedagogy captures the multi-dimensionality of architecture to consider buildings as living, unstable organisms inextricably linked to their thermodynamic context. Now more than ever, with so many political, institutional, and technological distractions to the discipline's crucial understanding, designers must step back, ignore the interference, and utilize the fundamentals of energy to set an agenda based on the depth of thermodynamics. By recognizing thermodynamics

first as a context for buildings in terms of site and environment, and then in qualitative terms for energy design--that is, utilizing available energy in a given system--we may finally design from the inside out by returning to architecture's most significant motivator: the human body. I deeply believe an agenda for more powerful architecture entwined with energetics will come to fruition and progress the profession during my career.

Every piece of matter in the universe exists to most powerfully dissipate energy, and buildings--living, unstable organisms--are no exception. Like other organisms, buildings may be considered in terms of their energetic action and value, as open systems within much broader contexts. The extents of a building's system boundary range not only in terms of physical geography, but also in the volatile terms of time. The flow of energy is never constant and continuous; buildings have life spans, and they avoid decay through their various metabolisms, pulsing cycles, and internal velocities. They are controlled non-equilibrium systems with an ordered disorder like the Bénard cell formations on the surface of the sun. Understanding buildings as resilient, adaptable, and changeable--whether programmatically, performatively, or functionally--precedes any credible discussion on thermodynamics.

The openness of architecture's system extends into a responsive and unending arena of thermodynamic context, the understanding of which has accumulated over centuries, spurred especially by potent 19th century thinkers such as Ludwig Boltzmann and Friedrich Nietzsche:

“And do you know what ‘the world’ is to me? Shall I show it to you in my mirror? This world: a monster of energy, without beginning or end; a firm magnitude of force that does not get bigger or smaller, that does not expend itself but only transforms itself; a whole, of unalterable size, a household without

expenses or losses, but likewise without increase or income; enclosed by

‘nothingness’ as a boundary.”<sup>1</sup>

Energetics must be discerned qualitatively in terms of exergy and entropy within the second law of thermodynamics rather than the closed-system first law. The first law indeed holds true holistically--total energy will be conserved--but the second law applies more specifically to the fluctuating relationship of architecture to its context: energy’s capacity to do work will not be conserved as more or less exergy will be utilized. The sun is a constant and limitless resource, an abundant luxury whose entropy is our exergy. A survivalist approach would utilize all available resources as powerfully as possible beginning with the sun, reversing the prevailing Calvinist dismissive notion of “waste.” Buildings must then maximize their energetic potential with an attitude of *use it or lose it* rather than *energy conservation and efficiency*. The thermodynamic notions adapted from physics and biology must not be understood as newfound additive technologies to apply onto buildings, but as the regulating context of the universe, the totalizing system which contains any building. Exergy, entropy, and energy represent the level of specificity architects must possess to grasp the depth of energetics in order to design within its context.

Both the technical and theoretical understanding I gain in my seminar classes on building systems and energetics translates directly to the studio sequence, a series of courses, one per semester, in which I manage a complete design project from a research phase through conceptual design to the full development of a building with its own narrative and thesis. I thrive on the

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<sup>1</sup> Friedrich Nietzsche, “Aphorism 1067 (1885),” in *The Will to Power* (New York: Vintage, 1968), 549-50.

constraints of a project, working on a difficult site or within tight programmatic parameters--the conceptual rigor derives from harnessing the potential from those very constraints. This is also where engineering meets art, where resolution and innovation combine to create the most compelling spaces. In my design process I strive for a productive discomfort to keep ideas fresh: zooming in to the scale of a wall detail, then out to the broader urban connections; creating with my hands through physical paper models, then scripting components digitally on the computer; diagramming the conceptual narrative, then tracing the load paths through columns, trusses, and beams. The constant movement in and out, back and forth keeps the lens through which I see the project clear, especially with regard to the energetic context. But of course, this avoidance of stasis only works within the consuming totality of architecture--as I said, insular design thinking is not an option.

Architecture must never lose sight of why any of this really matters. The thermodynamic agenda for any contextual and performative building involves responsibility, not only to the environment but also to the individual user. The abstractions of science are crucial, but architecture inevitably exists for the human body, its comfort and performance. After all, buildings mirror the energetic operations of human bodies as living, breathing, pulsing, aging, energy-seeking, non-isolated organisms within larger thermodynamic contexts. Beyond anything else, thermal comfort, proper lighting, and high-quality air define a building's performative success. As the size and volume of buildings continue to grow relative to occupancy, the attention to the human must remain as precise as ever. Responsible and sustainable design does not only concern gaining certifications or touting additive technologies, but must provide users comfortable building environments to learn from, experience, and occupy. Thus, only by

maximizing the needs of the human body can architecture fully utilize its potential exergy to operate thermodynamically in the most powerful manner possible.

This is exactly where my professional and academic goals align. I want to constantly learn and improve from the process of designing buildings, and I want to constantly evolve and expand the theoretical dialogue surrounding responsible environmental design. I want to establish an office, to seamlessly blend high quality design with a thermodynamic agenda. The buildings I work on and the people that surround me will come and go, but the development of my intellectual project will remain steady. My career will involve managing the constants within the inherent volatility of architecture--switching media, zooming in and out, panning across disciplines--to find a harmonic instability. As an engineer, artist, and designer, I need to avoid stasis. I need to design buildings.