Airflow Carving
Climate control experiments for enhanced comfort levels, Boston, USA

Summary and appraisal of the project by the jury
The design exploration begins with a set of provocative questions pertaining to the climate control of buildings and the design implications of alternative approaches to cooling, ventilation, and heating in construction. Can a building’s thermal mass be great enough to maintain a stable ambient temperature, while providing adequate ventilation, in a temperate northern climate? Can the flow of air be guided through a building with only architectural elements, and without ducts? These materials can be used to improve a building’s comfort level? In order to answer the questions, a series of experiments were undertaken in a laboratory setting. Using airflow as a carving agent through the building’s mass, architectural propositions were tested, while avoiding ventilation ducts. A combination of concrete and rammed earth is furthermore used as a construction material to maintain constant ambient temperature levels and thus enhance the structure’s comfort provision for users.

Though critical of the particular choice of the building’s function, the jury nonetheless valued the author’s aim to essentially rethink the role of mechanical systems in architecture, while taking recourse to traditional principles for cooling buildings. The jury particularly applauded the project’s critical stance concerning contemporary building practices and principally praised the bold exploration of alternative solutions using airflow as a generator for space- and form-making. Rather than perceiving technology as an autonomous domain, the projects merges technical with architectural exigencies, turning the logic of a quasi-neutral and anonymous system into one producing an architecture with specific properties – an approach that could be easily applied to a range of everyday uses and programs.

Statements on the sustainability of the project by the author
Planet - thermal battery as simple energy saver
Can a thermal mass be big enough to maintain a stable ambient temperature, and provide adequate ventilation, in a northern climate? Moreover, can it do so for an entire institutional building? Buoyancy-driven ventilation systems – and their consequential temperature-maintenance systems, can save energy, and work well in seasonally similar climates, as these can predictably provide livable interior conditions year-round. Places that use a disproportionately large amount of the earth’s available energy, however, are not in such climate zones, for example Boston. As such, a simple, monolithic “thermal battery” can be radiantly heated and cooled if water piped within it, and air channeled through its pores to deliver ventilation and temperature difference to desired spaces.

Progress – mechanical, structural and spatial systems are analogous
Can the flow of air be guided through a building with only architectural elements, and without ducts? Can cues from the thermal battery, which has a mechanical function (heating/cooling of air), a structural function (supporting the wooden volumes above) as well as a spatial one (hosting sensorially subdued exercise areas in its caverns), the composition of the terracotta clad top volume acts as a channel for air; first, its thick exterior walls are hollow, directing the freshly conditioned air from below up into the rooms, and allowing light to filter down; second, all the rooms are delimited by bent plywood planes, which, with their curved edges, scoop air from the hollow walls into the interior; the spaces between the terracotta volumes are both stairwells and exhaust chimneys.

Place – subtle contextual recuperation
Situated on the threshold between a historically residual low-rise neighborhood, and a mid-rise commercial one, the wellness center takes material cues from the surroundings to both complement and enhance them. The massive stone volumes of the latter induce the massive concrete base of the wellness center, while the nearly-uniform brick cladding of the former inform the massive concrete base of the wellness center, further, the terracotta volumes enhance the intimate nature of the program within, spatially suggesting non-institutional subdivision and privacy inside. Thus the stance is not imitation, but clever reciprocation.

Next Generation 4th prize 2017

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Project data
Project group: Architecture, building and civil engineering
Client: Harvard University
Project background: Research project

Image 1: A contextually sensitive (place) and environmentally innovative (planet) mental health wellness center for the downtown Boston area.
Image 2: A proposal that explores the possibility of buoyancy ventilation in a northern climate, by way of radially heated and cooled thermal battery. The entire material assemblage acts as a medium to create mechanical efficiency, structural efficacy, and spatial beauty (progress).
Image 3: Snapshots of pleasant interior atmospheres created in tandem with mechanical and structural function.
Image 4: An integrated material assemblage.
Image 5: Sensitive buffering of, and opening up to, site.
Image 6: Building materials as functional hybrids.