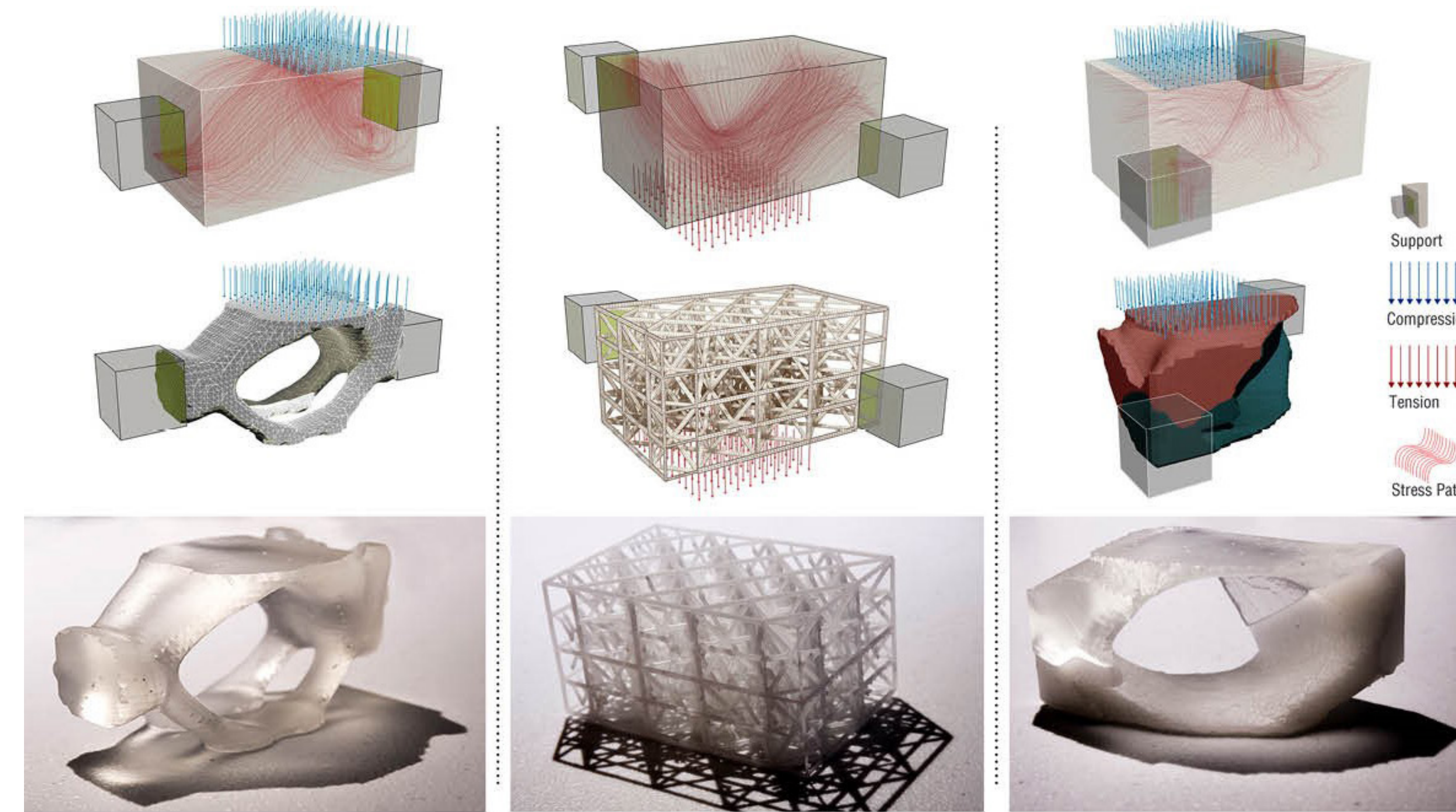




Multi-scale material systems research



Biologically inspired design for building applications



Topology optimization framework for building joints



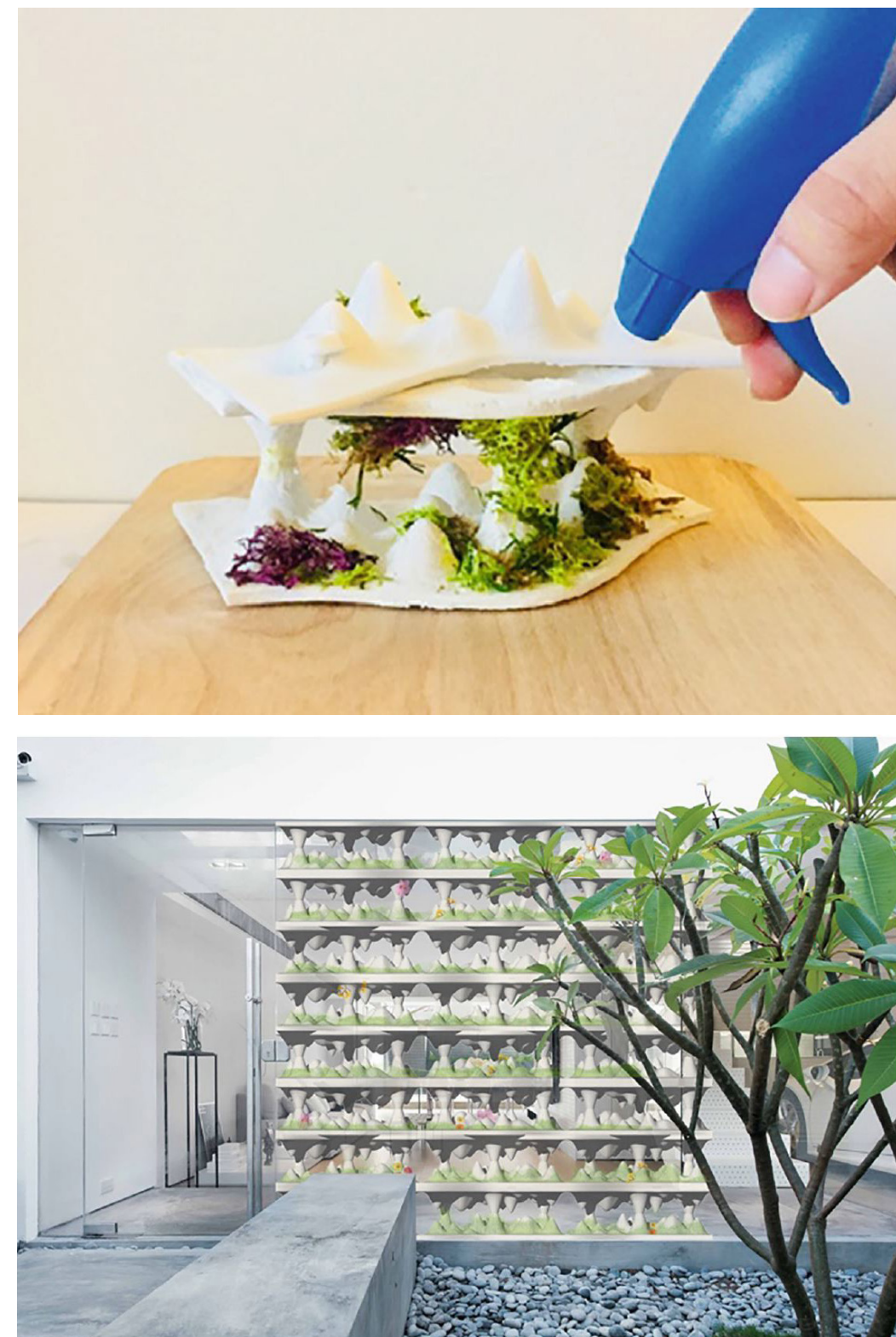
Architected soil research

OVERVIEW

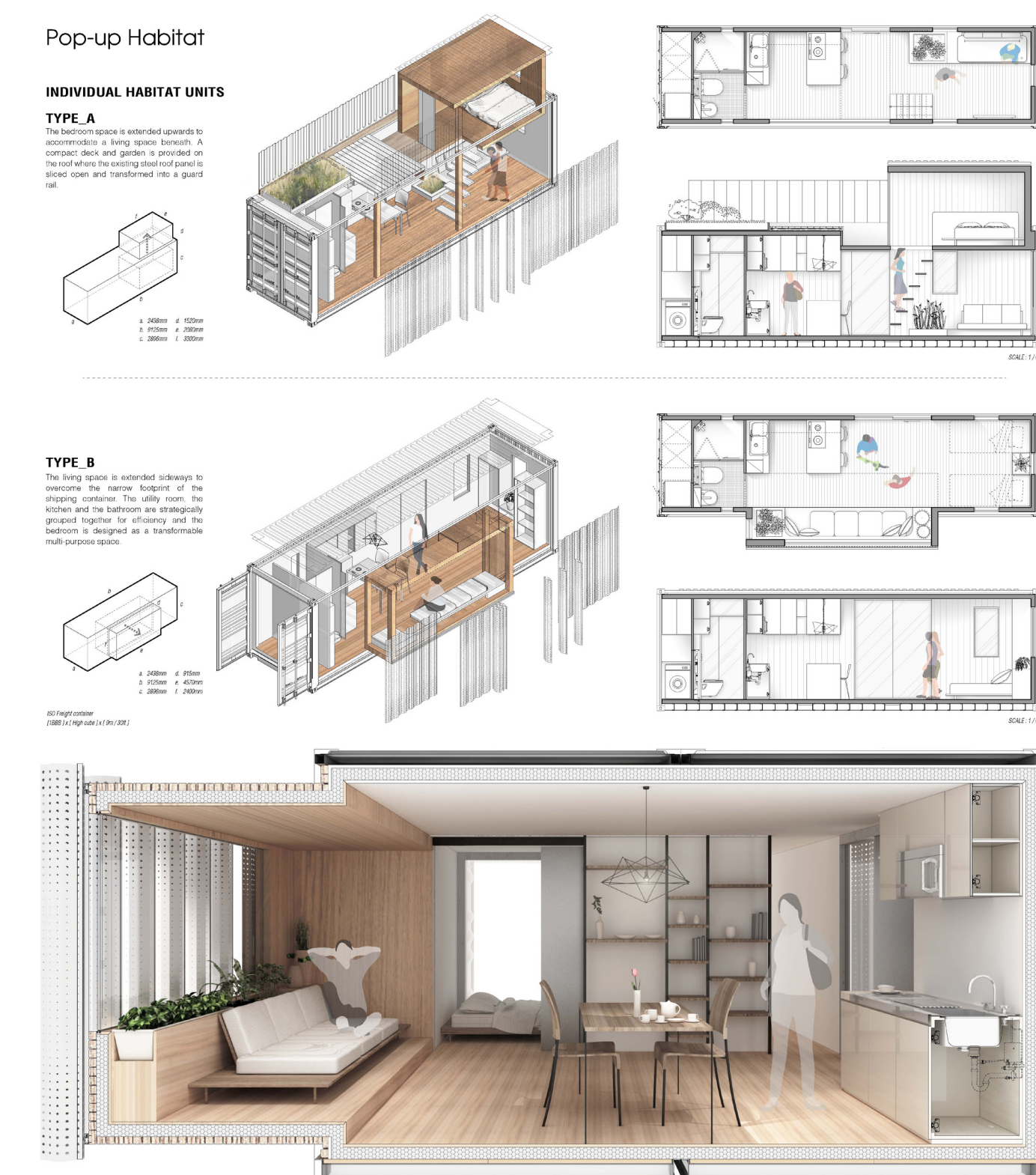
MATR is an interdisciplinary laboratory that focuses on the design, fabrication, and augmentation of materials for the built environment. The lab was established in partnership with the Syracuse Center of Excellence (Syracuse CoE) and the Syracuse School of Architecture (Syracuse SoA). The research and design projects at MATR ranges from developing new materials and building components; to designing furniture, buildings, and cities. MATR actively engages in academic and industry collaborations from the field of material science, environmental engineering, civil engineering, biology, and combustion & energy science.

PAST & PRESENT RESEARCH

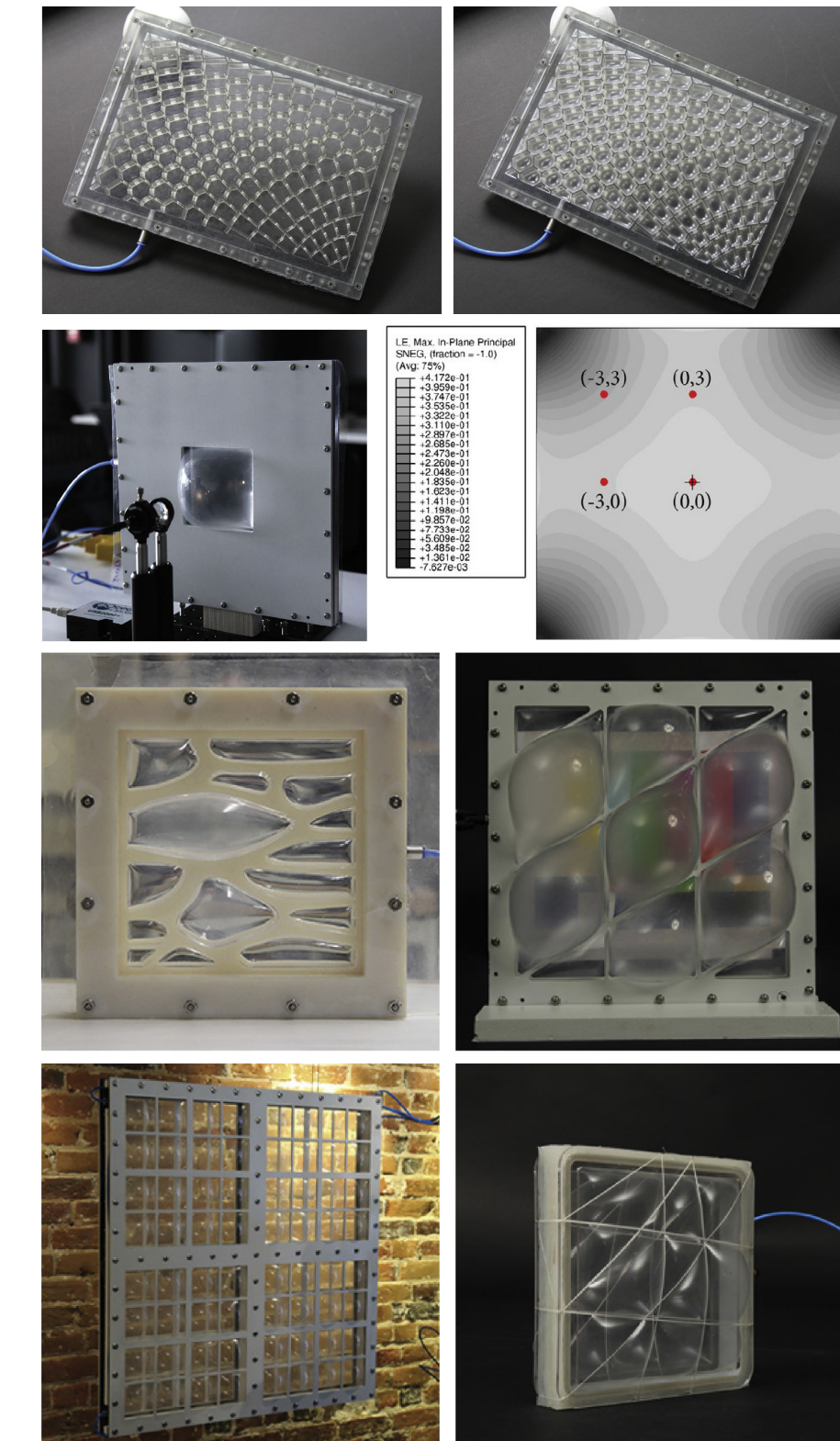
- Adaptive building envelop research
- Topology optimization framework for building joints
- Architected Soil research (geometry and fabrication)
- Tunable cellular materials for adaptive thermal control
- Pneumatically adaptive light modulation system
- Adaptive ETFE envelope system
- Mycelium composites for building applications
- Modular systems for building applications
- Mass timber high-rise building design
- Biologically inspired design for building applications
- Micro home research
- Integration of food production in the built environment



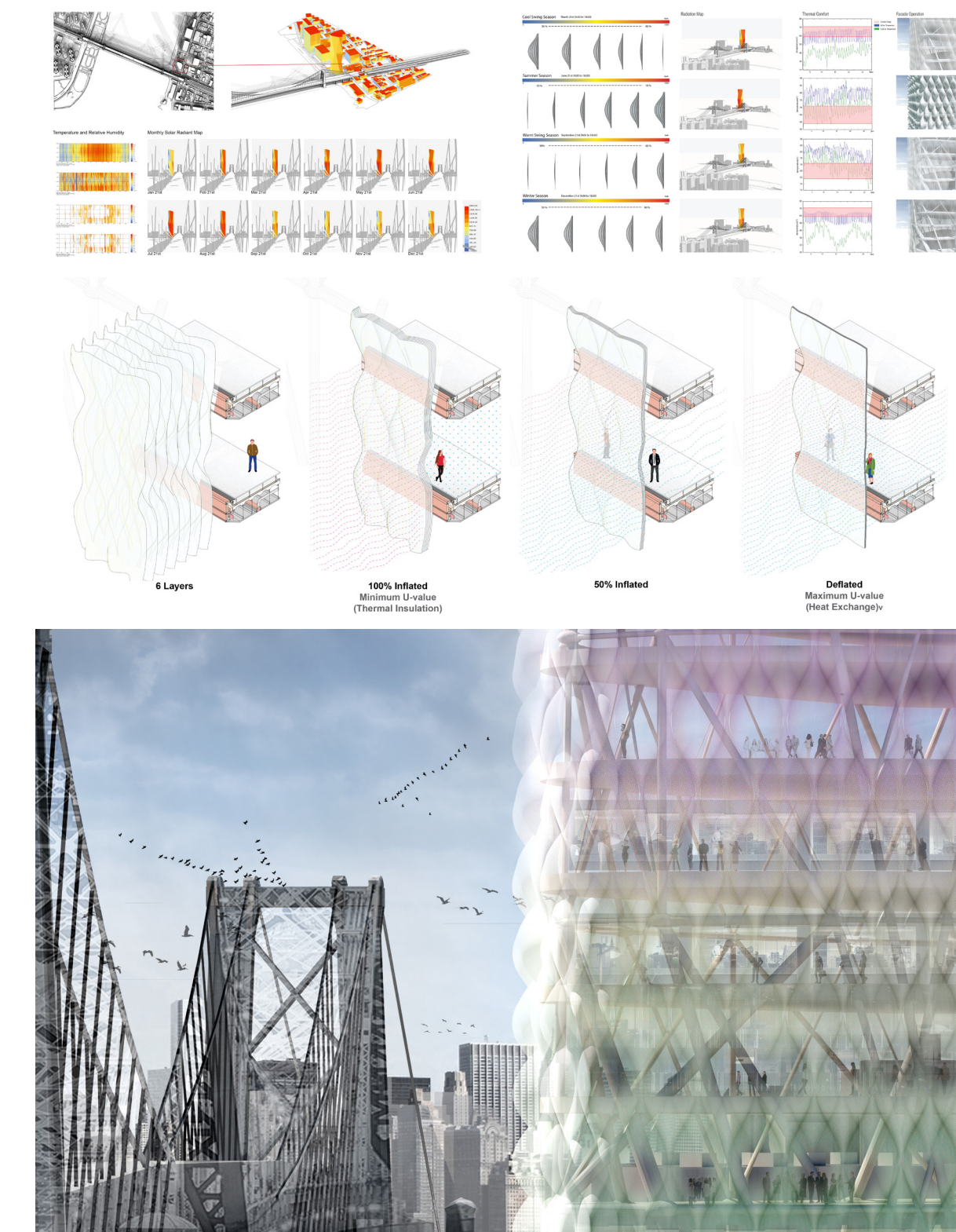
Weeping Brick: Modular Living Wall



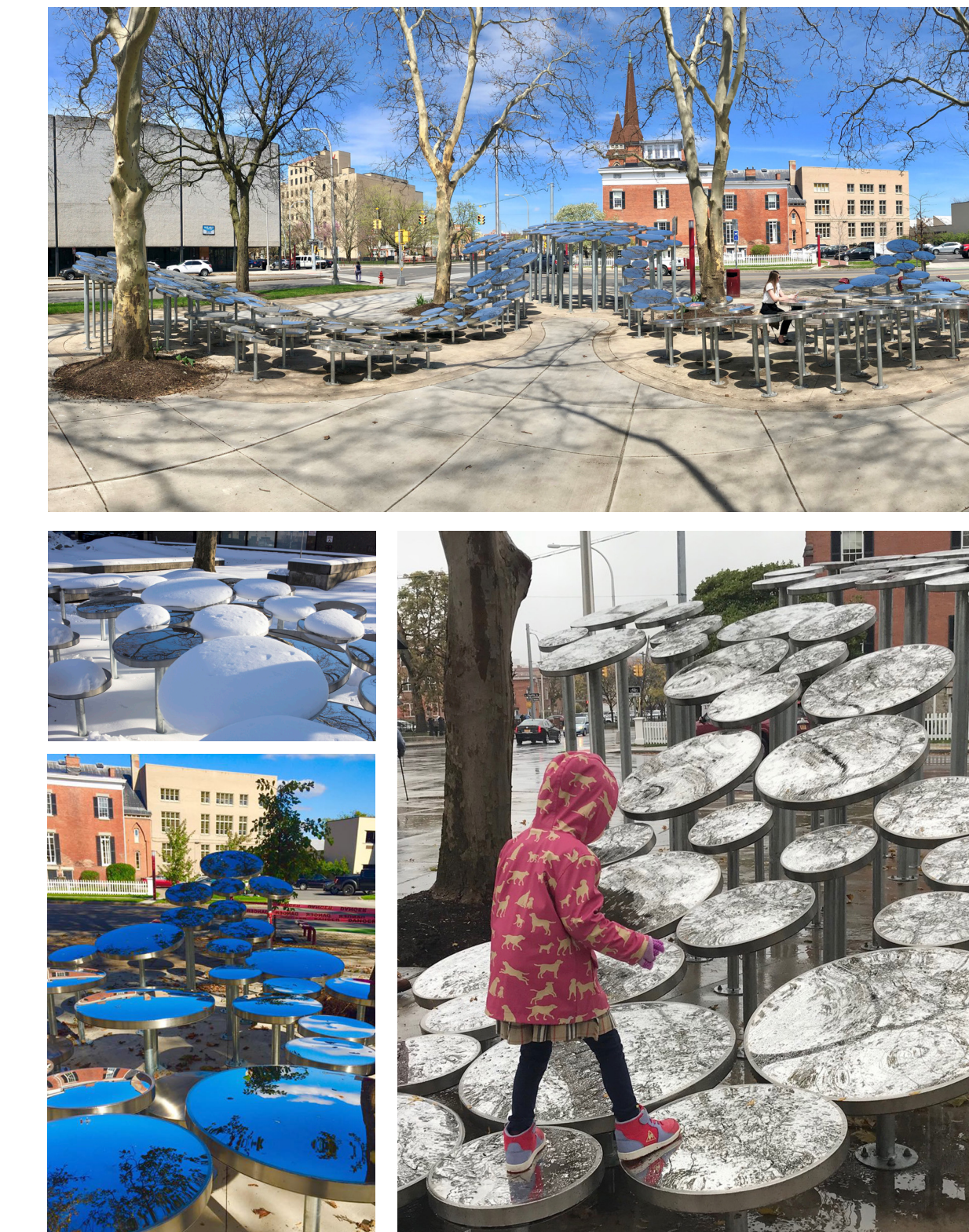
Modular Micro-home: Pop-up Habitat



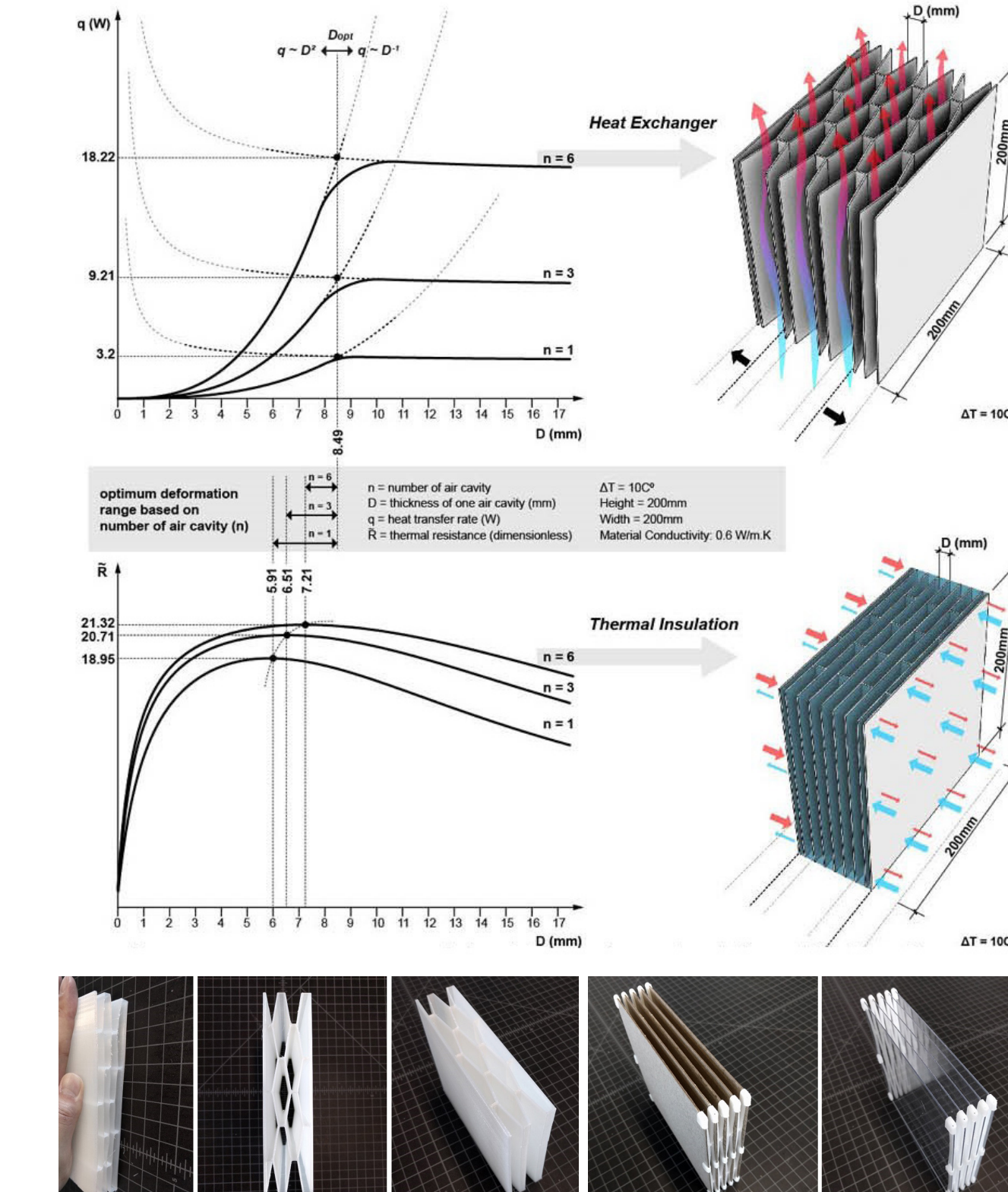
Pneumatic Light Modulation System



Adaptive ETFE envelope system



Immersive Cloud Installation



Tunable Cellular Materials for thermal control



Mycelium composites for building application

SCOPE

MATR focuses on four research trajectories: (1) Architected Materials, (2) Adaptive Architecture, (3) Biotectonic Architecture, and (4) Architectural Systems. The four research trajectories are interrelated and complimentary in many ways but each of them also has distinctive focuses that facilitate diverse and deeper investigations in materials.

The **Architected Materials research** focuses on augmenting the performance of affordable and durable common building materials such as concrete, brick, and wood through novel geometric configurations, rather than relying on high-tech but overly costly materials. The **Adaptive Architecture research** investigates architectural design, building systems, components, and materials that can transform, interact, or respond to the programmatic, functional or environmental needs. Both the design driven applications and the technology driven applications are explored in this trajectory. The **Biotectonic Architecture research** explores speculative, research driven, or built work that takes inspiration from nature in a broad sense. The morphology (i.e. patterns and form), physiology (i.e. function), and ecology (i.e. direct or indirect relationship) of living organisms all fall in the scope of this research trajectory. Lastly, the **Architectural Systems research** develop multi-scale design systems that implement modular design, adaptive design, and material effects in novel ways.

TEAM MEMBERS

Daekwon Park, Associate Professor, Director
 Tiffany Ng, M.Arch. Student
 Angelina Zhang, B.Arch. Student
 Chenhou Luo, B.Arch. Student
 Nicholas Chung, B.Arch. Student

Past Researchers:

Ting Yang, M.Arch. | Wenqian He, M.Arch. | Yağmur Yenice, M.S. | Sarah Beaudoin, B.Arch. | Ahnaf Chowdhury, B.Arch. | Ricardo Rodriguez Huerta, B.Arch. | Ji Yoon Bae, M.Arch. | Elena Echarri, B.Arch. | Hanneke Van Deursen, B.Arch. | Yuchi Kuo, M.Arch. | Yen Hsi Tung, M.Arch. | Bharat Krishnan, M.Arch. | Philip Weston Claghorn, M.Arch.

SPONSORS & COLLABORATORS

