Transformable Places | Explore Innovative Solutions for Climate Action and Urbanization
Options Studio by Taro Narahara

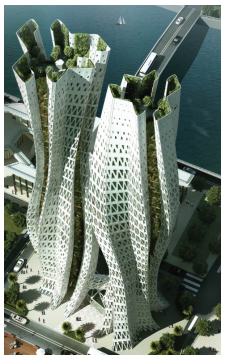
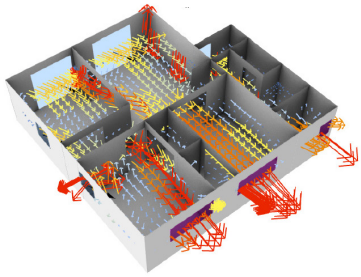
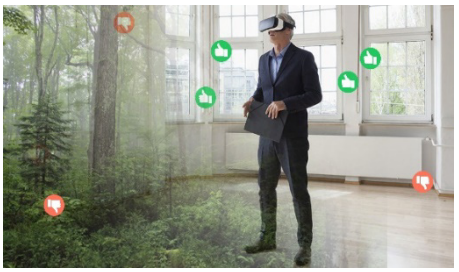
In recent years, the world has become increasingly urbanized in recent years. According to data released by the United Nations Department of Economic and Social Affairs, cities have housed more than half of the world's population since 2007, with that figure expected to rise to 60% by 2030. Cities and metropolitan areas currently account for 60% of global GDP. However, they do account for more than 70% of global carbon emissions and 60% of resource consumption. Rapid urbanization has begun to cause a variety of issues, including inadequate infrastructure and services for water collection, sanitation, and transportation systems, pollution, urban sprawl, food scarcity, and an increase in the number of slum dwellers.

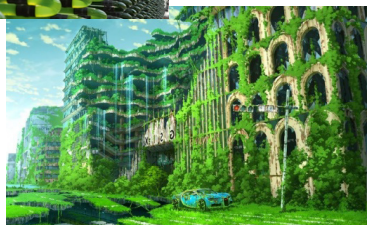
In this studio, students are expected to investigate unconventional, creative solutions in architecture and urban design to such problems. Students are encouraged to investigate novel ideas that promote sustainability and seek solutions to climate change. Some of the suggested research topics include: a transformable design that responds to various changes in usage patterns and environmental conditions; augmented/symbiotic usages of AI in design generations; integration of energy generation into building design; a city built around nature; a city without cars and streets; autonomous drone taxis; aerial rideshares; AI-driven new services; vertical farming; hydroponic farming; etc. We will focus not only on environmental performance but also on social and cultural issues in contemporary cities, such as the exponential increase in populations, diversifying cultural values associated with various conditions in public spaces, and undergoing socio-technological transformations.

While new technologies may help us improve our environmental conditions, the anticipated technological convergence is expected to cause radical changes in our lifestyles. Autonomous cars and drones, cloud computing, wireless energy and communications, and artificial intelligence are examples of next-generation technologies that could realize a transformative vision for a new way of life for future generations. Autonomous habitable drones, for example, would allow us to live, work, and travel wherever we want by acting as mobile pods. Under such hypothetical conditions, we will develop and acquire very different lifestyles, values, ethics, and social structures, and such changes will undoubtedly influence our real estate value system.

The studio is interdisciplinary by nature, and experts in urban design, computer science, and related fields will be scheduled to visit and share their ideas. We will use Rhinoceros Grasshopper and its various Plugins such as ClimateStudio and some Python programming for validation and assessment of environmental performance based on solar exposure, views, etc., as well as Head-Mounted Displays (HMD) such as Quest2 and Game Engines such as Twinmotion for visualizations. For years, the instructor has advocated for the use of virtual reality (VR) beyond the representation of design projects. We will further use the technology to evaluate, revise, and test digital models using VR. Based on students' needs and projects' potentials, proof-of-concept physical prototype developments to demonstrate sustainable performance of proposed systems can be offered as alternative to virtual explorations using the instructor's experience with electronics and machine learning algorithms.



Images (top to bottom): The Yilong Futuristic City Project developed by enzymeApd team in collaboration with TAKENAKA using the Twinmotion software, The OCT Xi'an International Center (OXIC) in Xi'an, China by EID Architecture, Air Flow analysis using Butterfly plugin, Thumbs up signs in VR associated with locations (a concept sketch for evaluations in VR), "Defy Reality", Oculus Rift Head-Mounted Display, Apocalyptic imagery by Tokyo Gensou. Algae-based Tubular manifold photobioreactors installed at Roquette Klötze & Co. KG (Germany).eVolo Skyscraper Competition (middle left).

New Jersey School of Architecture Hillier College of Architecture and Design NJIT

PCI Research Studio

MICRO HOUSING for Jersey City

ARCH 463/464 Option Studio - Spring Semester, 2024

Gernot Riether

Projects by: Abdurahman Oudeh + Samantha Volpicella, Karly Savinon + Ella Martz, Kashish Dalal + Lucas Konradparisi, Pictures of High-Concrete Plant

Twice as much concrete is used in construction around the world as all other materials put together. It is a material that we cannot entirely be replace quickly. This studio will therefore develop strategies to use **prefabricated concrete** in a more sustainable way. At the same time the studio will respond to the crises of **housing** and equity.

We will study assembly methods and details for a micro housing project and suggest models to improve the current environmental standards. The studio will team up with Ben Lo Piccolo and the BLDGUP Development Group to work strategies for micro housing. This will provide a unique opportunity to work on real projects with a developer and visit construction sites. We will develop strategies for new compact housing typologies such as Micro Housing that responds to high density living conditions, shared space, new boundaries between public and private and a digital / online culture.

We will explore the possibilities of formal complexities achieved through 3d modelling and develop full and/or half scale prototypes of facade panels using CNC to create the mold. Funding by PCI will cover trips to the production site and the **casting of prototypes**. The studio will collaborate with High Concrete Group, one of the largest Precast Concrete Plants in the US in the design, development, and production of full-scale façade panel prototypes. The best project team will receive a fully funded trip to the annual PCI meeting to present their project.