

DESIGN & MAKING ACROSS DISCIPLINES: Bio-Inspired Adaptive Interfaces

A Pilot Collaboration between AAP & Cornell Tech

Co-meeting courses

ARCH 7151 – Design Topic Research Studio (MS MDC students only) (6 credits)

ARCH 4101/4102/5101; ARCH 7113 – Option Studio (ARCH students only) (6 credits)

DESIGN 6151 (Cornell Tech students only); ARCH 4605/6605 Special Topics in Construction (3 credits)

FALL 2021: Tuesdays – 9am-1:30pm Studio; Thursdays - 9:05-11:00am Seminar + 11:15am – 1:30 Studio workshop

Cornell Tech Campus, NYC; Modality: Hybrid/In Person

Instructor: Jenny E. Sabin (Architecture) / jsabin@cornell.edu

Participating Instructors: Jonathan Butcher (Biomedical Engineering), Nate Cira (Biomedical Engineering), Wendy Ju (Information Science), Marty Murtagh (Materials Science & Engineering), Uli Wiesner (Materials Science & Engineering)

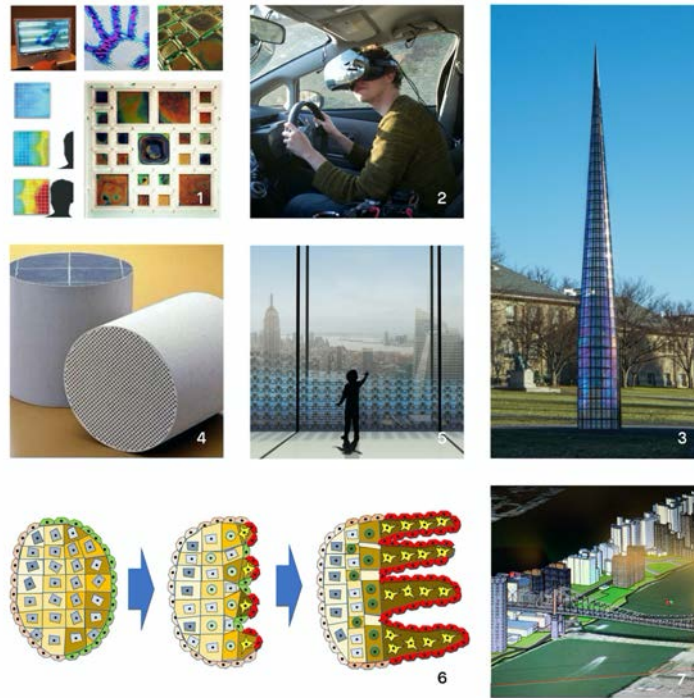


Figure 1 (1) – Responsive eSkin prototypes and simulations, National Science Foundation 2010 – 2014, Yang, Sabin, Lucia, Jones, Engheta, Van der Spiegel; (2) – Research by Wendy Ju lab @Cornell Tech; (3) - *A Needle Woman: Galaxy Was a Memory, Earth is a Souvenir* (Kimsooja). Cornell Arts Quad, 2015. Steel installation (1.3 m diameter at base, ~14 m height), window panels coated with iridescent self-assembling lamellar block copolymer film whose lamellar sheets were oriented vertically along the tower long axis, Wiesner Group; (4) - Ceramic wall-flow “checker-board” manifolded Diesel Particulate Filter (DPF) material preferences designed for all light and heavy- duty diesel internal combustion engines enabling the final automotive clean diesel particulate matter abatement systems, Murtagh; (5) – Rendering of eSkin adaptive building façade by Sabin Lab, 2015; (6) – Representation of biological emergent systems. Morphogenesis, the generation of shape, size, and structure from the local interactions of different cell types and their biophysical environments, Butcher; (7) - Research by Wendy Ju lab @Cornell Tech.

I. Rationale:

Although there have been tremendous innovations in design, material sciences, bio- and information technologies, direct interactions and collaborations between scientists, architects, and engineers are rare. One approach is to couple architectural designers with engineers and scientists within a research-based laboratory-studio to develop new ways of thinking, seeing, and working in each of our fields. **This combined studio+seminar is an introduction to fundamental concepts and methods in design and emerging technologies across architecture, engineering, and science to prepare students with the necessary tools and knowledge for iterative, hybrid, and synthetic thinking in design & making across disciplines.** Course work includes exposure to different theories, research, and practices of design and emerging technologies, making and digital fabrication (3D printing), computational and generative design, interaction design, new materials, sustainability, and bio-inspired design. Emphasis will be upon **problem generation** over immediate problem solving with specific focus in areas of materials and making, generative design, simulation, computational design, physical modeling, and digital fabrication within a hybrid lab+studio setting. This combined studio and seminar aims to engage and develop **hybrid thinking in design** through generative processes and digital fabrication of material and form across disciplines. Students from diverse disciplinary backgrounds investigate the intersections of architecture and science and apply insights and theories from biology and mathematics to the design, fabrication, and production of material products, prototypes, and digital tools. The final design project will focus on **responsive and adaptive interfaces and materials across scales and disciplines with a focus on human interaction, adaptive architecture, energy storage, and information display.** The first half of the semester will be co-taught by colleagues in architecture, information science, biomedical engineering, and materials science and engineering.