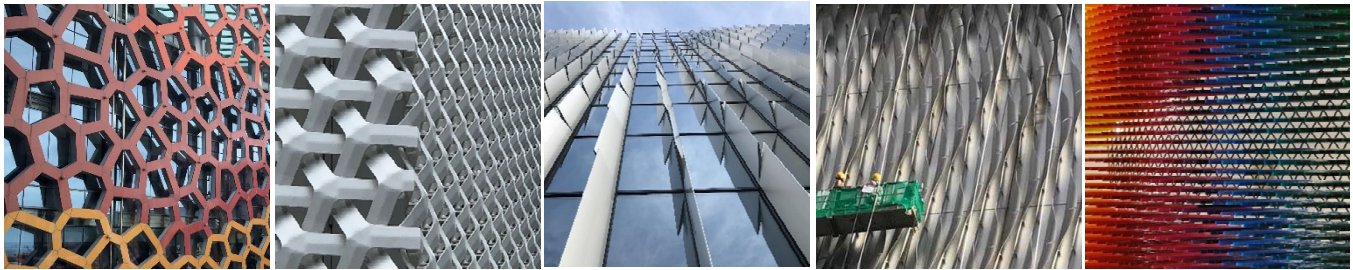


Net Zero Energy Retrofitting: Adaptable Kinetic Facades

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[Promise] We live in an era that faces global challenges of climate changes and resource depletion. With the rapid urbanization and growing energy consumption, building facades become ever more important in architectural practice and environmental stewardship. As existing buildings are responsible for more than half of the total energy consumption and CO₂ emission, energy efficient retrofitting promises a significant opportunity for energy and saving and emission reduction. There has been an increase in the integration of kinetic facades in contemporary buildings due to its environmental potentials and aesthetic construction. The kinetic façade can be one of sustainable solutions for net zero energy retrofitting.

[Problem] Building envelopes in contemporary buildings play an important role as a micro-climate controller and an aesthetic performer. One of primary problems of contemporary building enclosures is its “static” nature in relation to its “dynamic” environment. The studio focuses on kinetic building enclosures that correspond to dynamic environments in space, program, time, and occupants to balance multi-faceted design requirements as a mediator between indoor and outdoor.

[Objectives] This Diploma studio focuses on the design of a multimodal kinetic façade system. The studio activities consist of desk survey, parametric modeling, performativity measurements, prototyping, discussions, lectures, pin-ups, and reviews to maximize two primary learning objectives:

- The studio serves as a summative experience for the professional MArch degree.
- Design a project that exhibits conceptual, formal, aesthetic, technological and experiential clarity, criticality and sophistication, as it pertains to varying instructor-led themes.

[Project] The project is a *net zero energy refitting with kinetic facades* that contributes to innovations and vibrancy of cities. Kinetic façades can consider six degrees of freedom and address multimodal design goals of thermal, illuminous, airflow, water, ecosystem, energy, carbon, user experience as well as aesthetic quality. The project should create a compelling narrative for promoting the triple bottom line of sustainability for the city, focusing on one of the followings.

- **Active kinetic façades:** active systems deploying to predictive measures and/or real-time measures.
- **Kinetic material façades:** material systems responding to heat, air, and moisture (HAM) such as hygroscopic, thermos-bimetals.
- **Bio kinetic façades:** bio-based facades or biomimetic systems following functional strategies found in nature.

[Evaluation] This project is evaluated on architectural design quality, relevancy, and caliber of execution. The distribution of cumulative course assignments are as follows:

Assignment Description	Weight for Course (%)
Design project activities (total)	85%
Formal project presentations and documentation	<u>15%</u>
	100%

[Bibliography]

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- Moloney, J. *Designing Kinetics for Architectural Façades*. New York: Routledge, 2011
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