

## ***Approaching structures through studies of natural geometries and optimization technologies***

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Reintegrating architecture and structural engineering through new design tools offers a way to embrace a 'less is best' philosophy in response to resource constraints. It proposes teaching architects and engineers to design more with less, inspired by nature's optimization processes.

The concept of biomimetics is pivotal in using modern design methodologies to replicate natural processes. Through topology optimization, structures can be designed efficiently, minimizing material use. This method, common in the transportation industry for economic reasons, is also encouraged in building design to reduce material usage.

Several studies are presented: vertical cantilevers modeled after cacti, shell structures known for their material efficiency, and insect nests that exhibit varied functional and climate-responsive designs. These examples demonstrate nature-inspired efficient structural geometries.

Teaching architecture and engineering with shared tools such as topology optimization fosters collaboration. It combines the visualization of optimized material distribution and the assessment of structural efficiency, bridging the gap between aesthetic and functional design.

The paper stipulates that such interdisciplinary approaches can merge the disciplines of architecture and engineering, leveraging the aesthetics of efficient design to create sustainable structures.